



REMEDIAL ACTION WORKPLAN AND SITE MANAGEMENT PLAN

**OPERABLE UNIT 3 - KLOCKNER AND KLOCKNER SOURCE AREA
ROCKAWAY BOROUGH WELL FIELD SUPERFUND SITE
BOROUGH OF ROCKAWAY, NEW JERSEY
EPA IDENTIFICATION NO. NJD980654115**

TRC Job No. 163292

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List of Acronyms

bgs	-	Below ground surface
CD	-	Consent Decree
cfm	-	Cubic feet per minute
COC	-	Contaminants of Concern
CRZ	-	Contamination Reduction Zone
cm ²	-	Square centimeter
CQAPP	-	Construction Quality Assurance Project Plan
yds ³		Cubic yards
DGA	-	Dense Graded Aggregate
DIR	-	Daily Inspection Report
ECDI	-	East Coast Drillers Incorporated
EM	-	Electromagnetic Induction
EPA	-	United States Environmental Protection Agency
ft ²	-	Square feet
ft ³	-	Cubic feet
GAC	-	Granular Activated Carbon
GPR	-	Ground Penetrating Radar
HASP	-	Health and Safety Plan
ID		Inside Diameter
IGWSCC	-	Impact to Groundwater Soil Cleanup Criteria
IW	-	Inches of Water
K&K	-	Klockner and Klockner
lbs	-	Pounds
mg/kg	-	Milligrams per kilogram

MPR	-	Monthly Progress Report
µg/m ³		Micrograms per cubic meter
NJDEP	-	New Jersey Department of Environmental Protection
No.	-	Number
O&M	-	Operation and Maintenance
OU	-	Operable Unit
PCE	-	Tetrachloroethene
PDI	-	Pre-Design Investigation
PVC	-	Polyvinyl chloride
RA	-	Remedial Action
RCRA	-	Resource Conservation and Recovery Act
RAO	-	Remedial Action Objective
RAR		Remedial Action Report
RAWP/SMP		Remedial Action Workplan and Site Management Plan
RCA		Recycled Concrete Aggregate
RDR	-	Remedial Design Report
RDCSCC	-	Residential Direct Contact Soil Cleanup Criteria
RDWP	-	Remedial Design Work Plan
RG	-	Remediation Goal
RI/FS	-	Remedial Investigation/Feasibility Study
ROD	-	Record of Decision
ROI	-	Radius of Influence
scfm	-	Standard cubic feet per minute
SOW	-	Statement of Work
SVE	-	Soil Vapor Extraction

System	-	SVE Vacuum/Blower System
TCE	-	Trichloroethylene
TCLP	-	Toxicity Characterization Leaching Procedure
TRC	-	TRC Environmental Corporation
TRSR		Technical Requirements for Site Remediation
QA	-	Quality Assurance
QAPP	-	Quality Assurance Project Plan
QC	-	Quality Control
VET	-	Vapor Extraction Trench
VLS	-	Vapor-Liquid Separator
VOC	-	Volatile Organic Compound
VP	-	Vapor Probe

1.0 INTRODUCTION

This document is the Remedial Action Workplan and Site Management Plan (RAWP/SMP) for the Combined Soil Vapor Extraction System with Building 13 Volatile Organic Compound Excavation and Lead-Impacted Areas, designated as Operable Unit 3 (OU3) of the Rockaway Borough Wellfield Superfund Site, Morris County, New Jersey (EPA Identification No. NJD980654115).

TRC Environmental Corporation (TRC) prepared this RAWP/SMP on behalf of Klockner and Klockner (K&K) pursuant to the September 2007 Record of Decision (ROD) for OU3 issued by the U.S. Environmental Protection Agency (EPA) – Region 2 and the Consent Decree (CD) and Statement of Work (SOW) initially filed on November 20, 2009.

Site Description and History

The Rockaway Borough Wellfield Superfund Site (“Superfund Site”) is located in Rockaway Borough, Morris County, New Jersey (Figure 1). Rockaway Borough is situated in the center of Morris County, approximately 10 miles north of Morristown and 20 miles northwest of Newark in the north-central portion of New Jersey. Properties currently or formerly owned by K&K, identified as Block 5, Lots 1 & 6 and Block 7, Lot 7, have been designated as the Site or OU3 of the Rockaway Borough Wellfield Superfund Site.

The Superfund Site includes three municipal water supply wells (Nos. 1, 5 and 6), which are located off Union Street in the eastern section of the Borough. Groundwater at the municipal water supply wells is contaminated with volatile organic compounds (VOCs). Based on prior investigations, the suspected sources of the VOC contamination included industrial and commercial operations within the Borough, including OU3. The Klockner Source Area consists of two separate industrial properties in the northwestern portion of Rockaway Borough. The first portion of the Site is located north of Stickle Avenue and is referred to as the “Building 12 property”. The second portion of the Site, referred to as the “Building 13 property”, is located south of Stickle Avenue (Figure 2).

Investigations conducted by the New Jersey Department of Environmental Protection (NJDEP) at the Rockaway Borough Wellfield Superfund Site since 1980 indicated the presence of VOCs, primarily tetrachloroethene (PCE) and trichloroethylene (TCE), in the groundwater. Several inorganic compounds, including chromium, lead and nickel were also identified in the groundwater. This contamination, which had affected the wellfield, emanated from multiple source areas within Rockaway Borough. Under a cooperative agreement with EPA, NJDEP initiated a remedial investigation and feasibility study (RI/FS) to determine the nature and extent of contamination. The RI/FS utilized a soil gas survey that identified three potential source areas within the Borough. Based on these findings, EPA initiated a Phase II RI/FS to identify the

contaminant sources, further delineate the full extent of contamination and evaluate remedial action (RA) alternatives to address the sources of contamination. The Phase II RI/FS results indicated that:

- PCE-contaminated groundwater emanating from the Wall Street/East Main Street Source Area was impacting municipal wells No. 1 and 5;
- TCE-contaminated groundwater emanating from the Site was impacting municipal well No. 6; and
- VOC-contaminated groundwater was present in the Roned Realty Industrial Area (an industrial park in Rockaway Borough).

EPA organized the remedial work for the identified contaminating sources into four operable units for the Rockaway Borough Wellfield Superfund Site:

- Operable Unit 1 (OU1)
- Operable Unit 2 (OU2)
- Operable Unit 3 (OU3) (Site)
- Operable Unit 4 (OU4)

Due to historic operations at the Site, EPA determined that areas of the Site had the potential to be contaminated with TCE and other constituents. EPA entered into an Administrative Order of Consent (AOC) on September 27, 1995 with K&K, Joseph S. Klockner and Daniel Klockner III (collectively, the Settling Defendants) for OU3. K&K initiated the RI/FS for the Site in 1995. The RI included collection and laboratory analysis of soil samples and soil gas surveys to identify any on-site source(s) of contaminants and to delineate the nature and extent of potential contamination in the unsaturated soil at the K&K properties.

The RI/FS for OU3 was approved in August 2007 and the 2007 ROD was executed on September 27, 2007. The results of the Site RI/FS are the basis for the remedies selected in the 2007 ROD.

Pursuant to the 2007 ROD, the Remedial Action Objectives (RAO) for the contaminated, unsaturated soil at the Site are to:

- Reduce the potential for further migration of TCE and PCE from the contaminated soil into groundwater; and
- Mitigate direct contact exposure to lead-contaminated soil.

The selected Remediation Goal (RG) for soil was the applicable 1999 NJDEP Soil Cleanup Criteria (SCC). Specifically, the selected RGs were the NJDEP Impact to Groundwater Soil Cleanup Criteria (IGWSCC) of 1 mg/kg for both PCE and TCE, and NJDEP Residential Direct Contact Soil Cleanup Criterion (RDCSCC) of 400 mg/kg for lead.

Based on the above findings, the following RAs were specified in the 2007 ROD to address the on-site contaminated, unsaturated soil:

1. SVE for soil contaminated with VOCs at the Building 12 property;
2. Excavation and off-site treatment and/or disposal of an estimated 150 cubic yards (yds³) of VOC-contaminated soil at the Building 13 property; and
3. Excavation and off-site treatment and/or disposal of an estimated 27 yds³ of soil contaminated with lead, located at the Building 12 property.

A figure from the 2007 ROD, which depicts the prescribed SVE treatment area, is included as Attachment 1. The CD and SOW to implement the above RAs were initially filed on November 20, 2009. Pursuant to the CD, K&K designated TRC as the Project Coordinator for the remediation of the Site, which was approved by EPA on January 19, 2010.

1.1 Remedial Design Workplan and Remedial Design Report

Pursuant to the CD, TRC prepared the Remedial Design Work Plan (RDWP) to conduct the pre-design investigation (PDI). The RDWP was approved by EPA on July 29, 2010. The PDI included the following two main tasks:

- Collection and laboratory analyses of soil samples to delineate the two soil hotspots (lead and VOCs); and
- A Soil Vapor Extraction (SVE) field pilot test to determine the air permeability and radius of influence (ROI) for the final SVE system design.

The PDI was conducted from August 23, 2010 through October 10, 2011 and included:

- A Geophysical Survey by Ground Penetrating Radar (GPR) and Electromagnetic Conductivity (EM) at the Building 12 and 13 properties;
- Installation of soil borings at the Building 12 & 13 properties and collection and laboratory analyses of soil samples for lead and VOC, respectively;
- Installation of an SVE pilot test well, trench and vapor monitoring probes;
- Conducting the SVE pilot test at the Building 12 property; and
- Installation of a series of soil borings at the Building 12 property and collection of soil samples for laboratory analyses for lead.

The PDI for VOC contamination (Buildings 12 and 13) was completed in November 2010. Based upon the PDI results the Remedial Design Reports (RDRs) (35%, 65%, 90% and Final) for the VOC contamination (SVE system and excavation) were submitted to EPA for approval. EPA approved the Final RDR for VOC contamination on December 12, 2011.

The extent of the lead-impacted soils at the Building 12 property exceeded the delineation indicated in the 2007 ROD and required additional investigation. The horizontal delineation of lead-impacted soil was completed in October 2011. The results of the supplemental lead delineation program and the remedial design to excavate the lead-impacted soils at Building 12 were presented in the Pre-Final RDR. The EPA approved the Pre-Final RDR on June 21, 2012. The NJDEP conditionally approved the Pre-Final RDR in a letter dated August 14, 2012. The NJDEP requested collection of two additional post excavation samples from the isolated excavation located on the Oak Street Commons property. The NJDEP's comments were addressed in the Final RDR dated August 28, 2012.

1.2 Remedial Action Workplan and Site Management Plan

This RAWP/SMP has been prepared in general accordance with the EPA Guidance on Quality Assurance for Environmental Technology, Design, Construction, and Operation (EPA 2005) and the SOW/CD.

This RAWP/SMP identifies the personnel, procedures, methodology and instructions, which will be used in the field to implement the RA construction at the Site. In addition, this document discusses the steps for the quality control and the construction schedule for the RA.

The RA construction will be implemented in accordance with the EPA approved RDRs, Quality Assurance Project Plan (QAPP), the Construction Quality Assurance Project Plan (CQAPP) and the Site-specific Health and Safety/Contingency Plan (HASP/HACP).

To minimize redundancy, this RAWP/SMP makes reference to other project plans and supporting documents, (e.g., HASP, CQAPP, QAPP, etc.), where appropriate.

2.0 SCOPE OF REMEDIAL ACTION WORK

The RA for the Site requires excavating VOC-impacted soils at the Building 13 property and at the Building 12 property and includes installation and operation of an SVE system to address VOC contamination and excavation of lead-impacted soils.

The scope of work for the SVE system will include installation of 12 SVE wells, 24 vapor probes, associated piping to connect SVE wells to the SVE Blower/Treatment system (System) (Figure 3). The SVE system will be used to remove the VOC vapors from the vadose zone. Extracted VOC vapors will be treated with granular activated carbon (GAC).

The proposed scope of work for the Building 12 and Building 13 properties is to excavate and dispose of contaminated soil. The extent of excavation at Building 13 (Figure 4) will be approximately 760 square feet (ft²) and to a depth of 5 feet below ground surface (bgs), resulting in removal of approximately 155 yds³ of VOC-impacted soil. At the Building 12 property, an area of approximately 1,355 ft² at a depth that varies from 2 to 7 feet bgs will be excavated, resulting in removal of approximately 166 yds³ of lead-impacted soil (see Figure 5).

2.1 SVE System at Building 12

The installation of the SVE system at the Building 12 property will include the following components:

- Vertical SVE wells;
- Piping (header pipe connecting the SVE wells);
- Trenching (exterior piping);
- SVE Vacuum/Blower System;
- Vapor Probes (VP); and
- GAC Vapor Treatment Vessels

2.1.1 *Vertical Wells Layout and Construction*

The design for the SVE system includes 11 vertical SVE wells and one horizontal well, which will be used to remediate the 23,600 ft² of treatment area. The 12 SVE wells include the existing vertical well SVE-1 and horizontal well (trench) VET-1. A total of 10 new SVE wells will be installed at the Site. Seven SVE wells will be installed inside Building 12 and three SVE wells will be installed outside the building. The wells have been located based upon the calculated ROI of 30 feet and a detailed constructability assessment conducted in collaboration with the Site operations representative. The layout of the SVE wells is provided in Figure 3.

The SVE wells will be screened in the treatment zone and above the water table. The new SVE wells will be constructed with a 4-inch polyvinyl chloride (PVC) screen and casing. During the

installation, a TRC field representative will document the construction of the SVE wells. The construction details for the SVE wells are provided in Figure 6 (Detail 7).

The SVE wells will be equipped with ball valves to control the applied vacuum and induced flow at each well. The control valves for the wells inside the building will be placed above-ground and will be protected with bollards in many locations. The exterior SVE wells will be finished with manholes or vaults, and the control valves will be placed within the vault. Details of the SVE well completions are provided in Figure 6 (Details 1 and 2). These wells will be connected to the treatment system with 4- or 6-inch header pipes. The use of a 6 inch pipe for a section of header line 1 has been proposed to address friction losses. In an effort to keep friction losses similar for all piping headers the portion of header pipe 1, system-ward of SVE-3 was increased to 6 inches. This piping section represented the longest distance of pipe with flow from 4 wells, and would have had a significantly higher friction loss than the other header lines located closer to the system. The increase in pipe diameter by 2 inches results in a 225% increase in surface area, and a 225% decrease in air velocity, reducing friction losses in this long run.

2.1.2 Piping and Trenching

As described in the RDR, the SVE system will operate at a flow rate of approximately 312 cubic feet per minute (cfm) with four wells operating at a time. To distribute the flow over the 12 SVE wells (including the existing vertical well SVE-1 and horizontal well VET-1), the piping will be divided into three manifold legs connecting four SVE wells per leg (zone), as shown in Figure 3.

The SVE wells will be connected to the SVE blower system with 4- and 6-inch Schedule 40 to Schedule 80 PVC header pipe. The header piping inside the building will be 4- to 6-inch schedule 40 PVC, installed overhead. The overhead piping will allow minimal disruption to the facility's operation, and more flexibility in piping orientation. Details of the overhead piping supports and building wall penetration are provided in Figure 6 (Details 3 and 4). The header piping exiting the building will be fastened to the building wall with brackets placed every 12 inches apart, as indicated in Figure 4. The SVE wells installed outside the building in the parking lot will be connected to the system via 4- to 6-inch Schedule 80 PVC piping. Schedule 80 PVC piping has greater wall thickness and resistance to pressure, and it is more resilient than Schedule 40 PVC piping. So Schedule 80 will be used in the exterior trenches. Chlorinated Polyvinyl chloride (CPVC) pipe will be used on the exposed exterior piping runs due to its resistance to the ultra violet light.

The header pipes outside the building will be installed below grade in trenches as indicated in the cross-sections in Figure 6 (Details 6A and 6B). The preparation for the trenching operations will be similar to the preparation for the excavation activity as discussed in Section 2.2 of this report.

2.1.3 SVE Vacuum/Blower System

The System will be connected to header pipes coming from the three zones. The System will operate on electricity and will be programmed to operate on a pulsing/rotation mode by operating one zone (four SVE wells) at a time with a flow rate of approximately 312 cfm at each zone. The System will be equipped with two 1,000 pounds GAC vessels plumbed in series for vapor treatment. The approximate location of the System and the GAC vessels will be near the northern corner of the Site, as indicated in Figure 3.

The System will be housed in a trailer equipped with the following components:

- Manifold, which will be equipped with an actuated butterfly valve, airflow meters, vacuum gauges, and a valterra slide gate valve;
- Vapor-Liquid Separator (VLS) Tank, to separate any moisture from the vapor. The water will be stored in the tank until it is full, when a transfer pump will drain the VLS to an on-site holding tank;
- A blower with a capacity of 370 standard cubic feet per minute (scfm) @ 30 inches of water (IW). The blower will be equipped with a pressure relief valve and inline filters. The exhaust from the blower will have a silencer to dampen the noise levels from the exiting gases;
- Control panel to operate the system; and
- GAC Vapor Control.

2.1.4 Vapor Probes (VPs)

VPs will be installed to monitor soil vapor VOC concentrations, induced vacuum and, if required, allow for passive injection of air. Ten new VPs will be installed to complement the 14 existing VPs, which were installed during the PDI. The locations of the proposed VPs were selected such that these probes may be used as passive air injection wells to address potential stagnation/dead zones, if necessary, based on System monitoring. The locations of the VPs are depicted on Figure 2. TRC representatives will log the construction of the VPs in the field. VP construction details are presented in Figure 6 (Detail 7).

2.2 Excavation of VOC- and Lead-Impacted Soils

This section discusses the excavation and off-site disposal of VOC- and lead-impacted soils at the Building 13 and Building 12 properties, respectively. The excavation activity will involve the following stages:

- Preparatory Activities
- Excavation
- Post-Excavation Sampling (for lead-impacted soils only)

- Backfill Compaction
- Disposal
- Restoration

2.2.1 Preparation for Excavation

The following activities will be conducted prior to the excavation:

- A geophysical survey will be conducted by a GPR or Electromagnetic Conductivity (EM) to mark utilities/underground structures in the excavation areas.
- A New Jersey licensed surveyor will mark the excavation footprint at the Site.
- The asphalt at the Site will be saw-cut along the outline marked by the surveyors.
- The asphalt will be removed carefully without mixing the sub-base and loaded into the dedicated roll-offs. The asphalt will be disposed of at an asphalt recycling plant.
- All of the construction equipment, such as, backhoes and plate compactors, will be staged adjacent to the roll-offs until the excavation activity is completed.

2.2.2 Excavation of VOC-Impacted Soils at Building 13

The VOC-impacted soil at the Building 13 property will be remediated via excavation and off-site disposal. The limit of excavation for the VOC-impacted soil was defined during the PDI and documented in the RDR. The extent of excavation, approximately 760 ft² and 5 feet bgs, is depicted on Figure 4. The estimated volume of soil generated from the excavation is approximately 155 yds³, including a 10% bulking factor. Groundwater is not anticipated to migrate into the excavation because the depth to groundwater has been historically reported to be 13 feet bgs.

It is anticipated that the excavation will be conducted at a slope of 2 horizontal to 1 vertical (2:1). Any existing structures (e.g., temporary shed, utility pipe, fencing, etc.) will be protected and secured or relocated during the excavation activities. The temporary storage shed located approximately on the edge of the excavation will be emptied prior to commencing excavation activities. The excavation will be covered with polyethylene at the end of day to prevent any contact of surface water with VOC-impacted soil. The excavation will be secured with high visibility construction fence at the end of each day.

The VOC-impacted soils at Building 13 will be excavated and disposed off-site at an NJDEP-approved facility. The excavation will be backfilled with Recycled Concrete Aggregate (RCA) or alternatively, quarry processed Densely Graded Aggregate (DGA).

2.2.3 Excavation of Lead-Impacted Soils at Building 12

The analytical results of the soil samples from the 2010 and 2011 investigations define the horizontal and vertical extent of the excavation at Building 12 and the Oak Street Commons (Figure 5). The extent of excavation for the lead-impacted soil has extended beyond the limits defined in the 2007 ROD. The new limits of excavation are presented in Figure 5.

The soil excavation has an area of approximately 1,355 ft² and a depth that varies from 2 to 7 feet bgs. The excavation area will be divided into four categories based on the total depth (2, 3.5, 4 and 6 to 7 feet bgs). These four excavation depths are depicted on Figure 5.

A limited excavation will be conducted at sample location B12PB-27 to remove an isolated hotspot (Figure 5) in the Oak Street Commons. The excavation will extend to the nearest clean sample location, B12PB-26. The approximate area of excavation at sample location B12PB-27 will be 95 ft² and the depth will be 3.5 feet bgs. The excavation will be sloped to 2 feet bgs toward sample location B12PB-26.

The Site groundwater is not anticipated to migrate into the excavation because the maximum excavation depth will be between 6 and 7 feet bgs and the depth to groundwater has been historically reported at approximately 13 feet bgs.

The total volume of soil to be excavated for off-site disposal is estimated to be approximately 166 yds³, including a 10% bulking factor.

2.2.4 Post-Excavation Sampling

As approved by EPA and NJDEP, no post excavation samples will be collected from the main excavation footprint for the following reasons:

- In accordance with the approved RDWP and RDR the pre-characterization samples collected during the PDI phase will serve as the post-excavation samples for the side walls and the base/bottom of excavation.
- The perimeter and base/bottom delineation sampling frequency exceeded the requirements for the NJDEP post-excavation samples which were defined in the NJDEP's February 22, 2011 Technical Requirements for Site Remediation (TRSR) N.J.A.C 7:26E-6.4(a)2i and ii.

The delineation of lead-impacted soil, presented in the Pre-Final Lead-Impacted Soil RDR, is considered complete for the main excavation, as approved by NJDEP and USEPA.

With the exception of sample locations B12PB-8 and 34, the bottom of the excavation has been fully delineated for lead contamination. TRC will collect a confirmatory post-excavation sample for lead analysis, upon excavation of lead-impacted soil at sample locations B12PB-8 and 34.

In addition, TRC will collect two post-excavation samples to address NJDEP's comment on the Pre-Final RDR about the isolated excavation area (location B12PB-27), which is located on the Oak Street Common's property. These samples will be collected from the north and east excavation side walls, and will be analyzed on an accelerated turn-a-round time.

2.2.5 Backfill and Compaction

Contingent on meeting geotechnical requirements for the Site as well as the analytical requirements as defined in the NJDEP's Alternative and Clean Fill Guidance for Site Remediation Program Sites (dated December 29, 2011) (Clean Fill Guidance), TRC will use recycled concrete aggregate (RCA) as backfill for the excavation. The backfill will be procured from an NJDEP-licensed recycling facility. By using RCA for the backfill, the project will be promoting sustainable practices that limit landfilling of usable material.

Alternatively, quarry processed certified clean fill dense graded aggregate (DGA) may be used as backfill. The use of DGA from a certified quarry would be in compliance with the Clean Fill Guidance. In accordance with the Clean Fill Guidance, that TRC will obtain the analytical results for one sample from the quarry and document the backfill material is free of contamination. Fill records will be maintained for every load that is imported to the Site. Copies of these records will be presented to EPA in the Remedial Action Reports (RARs).

The backfill material will be placed in one foot lifts and will be compacted with a plate compactor/roller/back of the backhoe bucket. The soils will be compacted to 90% of the maximum dry density as determined by Method C of ASTM D1557 (Proctor Tests) for that soil.

2.3 Disposal of VOC- and Lead-Impacted Soils

The excavated soils will be loaded onto polyethylene lined roll-offs and covered with waterproof tarpaulins at the end of every day. The roll-offs loaded with soils will be temporarily staged on-site in the parking lots on the northern side of the Building 12 and Building 13 properties.

Alternatively, the soils may be temporarily stockpiled at the Site on plastic sheeting and will be covered with plastic at the end of every day. TRC will seek to minimize the volume of soil stockpiled at the site by removing excavated soil periodically as the remediation progresses. Soil samples for waste characterization purposes will be collected prior to or during the excavation activity and will be analyzed in accordance with the disposal facility's protocol. This practice will reduce the time for staging the excavated soil at the Site. Manifests will be recorded and maintained for all soils disposed off-site. A copy of the manifests will be provided to EPA in the RAR. The soils will be disposed of at Hazleton Creek Properties, LLC, located at 282 South Church Street, Hazleton PA.

2.3.1 Restoration of Site

The excavation activities at the Building 12 property and the Oak Street Commons will disrupt the parking lots, the side curb at the Oak Street Commons and the chain link fence between the two properties. The parking lots, chain link fence and the curb sides will be restored to their original conditions after completion of the project activities.

The excavation activities at the Building 13 property will disrupt the Site driveway. Upon excavation of VOC-impacted soil the driveway will be restored to its original condition.

3.0 MODIFICATION TO THE APPROVED FINAL REMEDIAL DESIGN REPORT

This section will discuss and identify potential changes (if any) in the RA construction project schedule and final design.

3.1 Remedial Action Construction

The RA construction at the Site will include installation of the SVE System, and excavation of VOC- and lead-impacted soils.

3.1.1 *SVE System*

The proposed blower included in the EPA approved SVE system, Model SAP530-4.8, is no longer manufactured. TRC proposes an alternative blower model SB-0710D-6.3, which has the same specifications as the approved blower. The specifications on the proposed new blower were submitted to the EPA with the June 2012 Monthly Progress Report (MPR).

Additionally, to address noise considerations, TRC proposes to house the system in a skid-mounted enclosure. The skid-mounted unit will have advantages over a trailer-mounted system in that sound-insulating material can be installed more evenly within the skid enclosure. The proposed unit will also occupy a smaller foot-print when compared with the trailer-mounted system.

The location of any of the identified SVE components may change in the field due to Site/field constraints. These changes will be recorded in the as-builts.

3.1.2 *Excavation of VOC- and Lead-Impacted Soils*

The extent of excavation for VOC- and lead-impacted soils are indicated on Figures 4 and 5. TRC will not excavate any soil or part of the foundation that may potentially damage the integrity of Building 12, the Quonset Hut or the temporary shed at the Building 13 property, as indicated in the RDRs. Currently, there are no proposed changes to the excavation footprint. If the excavation footprint or depth is changed from the original approved location, TRC will mark the location and provide the details with the as-builts.

3.2 Project Schedule

Construction activities, including installation of SVE wells and VPs and excavation of VOC- and lead-impacted soils, are anticipated to commence in October 2012 and to be completed within three months. EPA will be notified in the regular MPRs of any changes in the project schedule.

4.0 SITE MANAGEMENT PLAN

This Site Management Plan part of the RAWP/SMP has been prepared by TRC in accordance with the SOW and the CD to implement the RA work at the Site. This document, along with the HASP, Final RDR for VOC- and lead-impacted soils, QAPP and CQAPP is intended to provide the framework for managing remediation-related construction activities at the Project Site.

The SMP identifies the RA team, construction schedule, construction sequence, plans for managing site access and use, security, permitting requirements, and managing waste disposal

4.1 Remedial Action Team

The RA team, roles and responsibilities has been presented in the Section 2.2 of the CQAPP. This section of the CQAPP identifies the organizations and key personnel participating in the construction of the RA at the Site. The specific roles, responsibilities of the key personnel, lines of authority, reporting relationships and communication pathways are provided in the CQAPP.

The Field Team, includes: Program Manager; Deputy Project Manager/Project Engineer; QA Manager, Field Coordinator/Site Safety Officer and Sub-contractors are identified in Table 1. The resumes for each field team members are included in Appendix A.

4.2 Permitting Requirements

TRC or its sub-contractor will secure all the necessary local/state permits prior to commencing of RA construction. TRC has identified a list of permits below that will be obtained at a minimum for the RA construction:

1. The SVE wells and VPs will be installed by a New Jersey licensed driller. In accordance with the N.J.A.C. 7:9D-1-11, the driller will obtain well permits for each SVE well and VP prior to installation. Upon installation of the wells, the driller will prepare the as-builts and submit them to the NJDEP. In the RAR to be submitted to EPA, TRC will include copies of the well permits, Forms A & B, and construction logs with the as-built information for the wells.
2. TRC will hire a New Jersey licensed electrician to install the electric connections for the SVE treatment system. The electricians will obtain the necessary permits and approvals from Rockaway Borough.
3. The required, 'New Jersey One Call' for utility clearance will be made by the contractor prior to commencing the field activities.
4. TRC will obtain an Air Permit from the NJDEP to operate the SVE system.
5. The TRC appointed contractor for the RA construction will obtain the necessary Local Construction Permits from Rockaway Borough.

4.3 Health and Safety/Contingency Plan

The Site specific Health and Safety Plan (HASP) to implement the remedial action construction at the Site has been prepared and submitted to the EPA. During the RA construction a copy of the HASP will be available at the Site for the field crew. The HASP identifies the TRC team members that will be involved in this project, the emergency contact information for the local authorities, contamination found at the Site, required PPE, air monitoring equipment and screening levels. The HASP discusses potential hazards found at the site and the necessary mitigation measures for the hazards, the site control measures and the health and safety programs.

Prior to commencing the RA construction, if needed TRC will contact and notify the Rockaway Township's Construction/Engineering Department. .

4.4 Construction Details

This section provides the details which will be implemented during the RA construction activities at the Site.

4.4.1 Site Preparation and Access

Prior to commencement of the RA construction, TRC will conduct the following activities:

- A preparatory meeting will be conducted between TRC and the construction sub-contractor(s) to review the scope of work, schedule and safety measures that will be implemented at the Site.
- Review and provide comments on the sub-contractor's HASP;
- TRC's site-specific HASP will be shared with the sub-contractor(s);
- TRC field personnel and sub-contractor(s) will review the applicable regulatory documents (e.g., ROD, SOW, etc.);
- The scope of work and construction sequence will be discussed and planned;
- TRC will appoint a field coordinator. The duties of the field coordinator are discussed in section 4.4.3;
- TRC and the sub-contractor(s) will order equipment and supplies for the construction;
- TRC's sub-contractor(s) will mark utilities at the Site; and
- Surveyor will mark the excavation footprint.

The following activities will be conducted on a daily basis prior to the commencing of construction activities for the day:

- Calibrate monitoring equipment (e.g. VOC and dust monitors);
- Equipment will be inspected to identify any damage;
- A tailgate meeting will be conducted to discuss construction work;

- Activity hazard analysis will be conducted during the tailgate meeting to assure safety requirements are met; and
- Examine the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

At the start of the project, a staging area and decontamination pad will be created in the parking lots of the Building 12 and Building 13 properties, as indicated in Figures 4 & 5. Equipment required for the RA construction will be mobilized to the Site and staged in the staging area. Buildings 12 and 13 are fenced and have a gated entrance/exit so no special fencing or security arrangements are required for the safekeeping of the equipment. A dedicated parking space will be reserved for the vehicles of the construction workers and TRC personnel at the property adjacent to Building 13.

4.4.2 Construction Sequence

The construction schedule (Figure 7) depicts the various stages of the RA construction and the order/sequence in which it will be implemented at the Site. The RA construction schedule (Figure 7) has been prepared in consultation with the contractor as well as the property owner/tenant for the Building 12 and Building 13 properties.

4.4.3 Site (Field) Coordination

As part of the site preparation, TRC will appoint a Site/field coordinator. On a daily basis, the field coordinator will report directly to the QA Manager (Table 1). TRC's field coordinator will communicate directly with the sub-contractor's foremen coordinator on a day-to-day basis. TRC's field coordinator will be responsible for the following activities in the field on a daily basis:

- Conduct a tailgate meeting;
- Address health and safety through the implementation of the Site-Specific HASP;
- Verify that construction is conducted in accordance with all specifications and designs; and
- Complete field forms as defined in the CQAPP.

4.4.4 Site Facility

The proposed RA construction will be conducted in the parking lots of the Building 12 and Building 13 properties and inside the Building 12 property. These Buildings are active facilities and are equipped with basic necessities, such as restrooms, a source of water, electricity, heating etc. These facilities will be used by the TRC field personnel, the sub-contractors, EPA officials and US Army Corps Engineers officials.

A dedicated Site trailer for the RA construction will not be mobilized to the Site because the duration of the construction activities is very short. In addition, the available space to park the trailer at the Site is very limited. TRC field personnel and sub-contractor will store all the necessary paperwork in the field vehicles. All communications between the field coordinator and the Field Team/QA Manager/Site Safety Officer will be done via cell phones.

4.4.5 Documentation and Reporting

Prior to, during and at the completion of RA construction TRC will photo and video document the Site conditions as discussed in Section 5.0 of CQAPP. In addition TRC will follow the procedures for documentation and reporting as detailed in the Section 5.0 of the CQAPP.

The CQAPP summarizes the required submittals and records e.g. Daily Inspection Report (DIR); Well Construction Logs; Meeting Minutes; Photographic logs; Weekly and Monthly Progress Reports; Construction As-built Reports; Compliance Testing Report and Construction Completion Report. These reports will be filled throughout the course of the RA Construction phase. These documents will be completed as per the frequency discussed in the CQAPP. These documents will be submitted to the EPA with the RAR.

All of the project documentation prepared and collected by the TRC field coordinator will be reviewed and verified by the TRC Engineer, or their designee, for conformance with the specifications and scope of work.

4.4.6 Soil Handling and Disposal

This section will discuss the soil handling procedures that will be implemented at the Site. The RA activities at the Site will generate asphalt, concrete, soil and VOC- and lead-impacted soils for disposal. The soils will be sent to the Hazleton Creek Properties, LLC site in Hazleton, PA for disposal.

Soil Cuttings from Well Installation

The soil cuttings generated from the installation of the SVE wells and the VPs will be collected in 55 gallon drums. It is anticipated that the installation of the SVE wells and VPs will generate approximately fifteen 55 gallon drums of soil. Based upon the historical analytical data, it is anticipated that soil generated from the Site will be non-hazardous. These drums will be labeled as, “Non-Hazardous and Pending Analysis” and will be staged in the staging area (Figure 5).

Waste characterization samples will be collected from the drums and analyzed in accordance with the disposal facility’s protocol. The samples will be collected in laboratory-provided dedicated jars and will be sent to Accutest Laboratories in Dayton, New Jersey for analysis. An appropriate disposal facility will be selected upon receipt of the analytical data. Manifests for the

disposal of soil cuttings will be maintained in the file and a copy will be provided to EPA in the RAR.

Asphalt from Excavation and Trenching

Prior to the trenching and excavation activities the asphalt within the footprint of excavation and trench will be saw-cut and removed carefully without mixing it with the sub-base. The asphalt will be collected in dedicated roll-off(s) and recycled at an asphalt plant. Manifests will be recorded and maintained in the files for any asphalt disposed off-site. A copy of the manifests will be provided to EPA in the RAR.

Concrete from Well Installations

It is expected that a very limited quantities of concrete from the installation of the SVE wells and VP will be generated. The concrete will be disposed at a Class-B recycling facility. Manifests will be recorded and maintained in the files for any concrete disposed off-site. A copy of the manifests will be provided to EPA in the RAR. Alternatively, the concrete will be disposed as solid waste in accordance with the NJDEP's Guidance for Characterization of Concrete and Clean Material Certification for Recycling (dated January 12, 2012).

Sub-Base Material

The sub-base generated during the trenching/excavation activities will be re-used to restore the parking lots. The sub-base material will be temporarily stockpiled adjacent to the trench or excavation for easy re-use. The sub-base material will be stockpiled on, and covered by polyethylene to prevent any run-off from the stockpile.

Trench Soils

The soil generated from the trenching activities at Building 12 will be stockpiled along the trench. After the installation of the piping, the trench will be backfilled with bedding material (3/4" stone) followed by excavated native material, sub-base and asphalt, as depicted in Figure 6. A portion of the native material will be re-used as backfill material, while the remainder will be collected in roll-offs. The excess material will be transported to the roll-off via a small, 2-3 yd³ dump truck, front-end loader or wheelbarrows where access is limited. The roll-offs will be lined with plastic and covered with waterproof tarpaulin. Alternatively, the soils will be temporarily stockpiled at the Site and disposed off-site during regularly scheduled load-out events.

The trenching activity will generate approximately 24 yds³ of soil for disposal, which is slightly more than one roll-off. The trench spoils will be disposed with the excavated impacted soils, which is discussed below.

VOC- and Lead-Impacted Soil

Lead- and VOC-impacted soils generated from Buildings 12 and 13, respectively, will be loaded onto plastic lined dedicated roll-offs. The material will be transported to the roll-off via a 2-3 yd³ dump truck, front-end loader or wheelbarrows where access is limited. The roll-offs will be covered with waterproof tarpaulin on a daily basis to prevent any water entering into the roll-offs. Alternatively, the soils will be temporarily stockpiled at the Site and disposed off-site on the following day. The material will be disposed at an appropriate and EPA approved facility. The excavation of lead- and VOC- impacted soil will generate approximately 166 yds³ and 155 yds³ of soil, respectively.

During the PDI a sample for waste characterization purposes was collected from the lead excavation footprint, located at the Building 12 property. The analytical results for the sample indicated the soil is not hazardous. The sampling results will be used for the disposal purposes. If required, TRC will collect any additional waste characterization samples for the disposal of lead-impacted soil. The samples will be collected in-situ or while excavating the lead-impacted soil.

During the delineation effort two waste characterization samples were collected from the VOC-impacted soil excavation footprint located at the Building 13 property. These samples were never analyzed and were discarded because these samples did not represent the proposed excavation material, as they were collected at a depth below the proposed excavation. Soil sample/s for waste characterization purposes will be collected prior to or during the excavation activity/Remedial Action phase and will be analyzed in accordance with the disposal facility's protocol.

The soil samples will be collected in laboratory provided dedicated jars and will be sent to Accutest Laboratories in Dayton, New Jersey for expedited analysis.

Backfill Material

The backfill material (e.g. RCA, DGA, ¾" stone, etc.), will be temporarily stored on-site, a sufficient distance from the excavation/trench to prevent slope failure. The contractor will be required to provide documentation that any material imported to the Site is approved for unrestricted use in New Jersey. The material will be used to backfill the excavation/trench as indicated in the CQAPP. The backfill material will be placed in one foot lifts and will be compacted with a plate compactor.

The roll-offs for asphalt, trench soils, VOC- and lead-impacted soils will be stationed at the respective staging areas (Figures 4 & 5). Each roll-off will be labeled to identify the type of material to be stored. The sub-contractor will transport the material from the trench or excavation and will place it into the dedicated roll-off. Upon characterization of the material and finalization of arrangements with a disposal facility, the roll-offs will be moved off-site for disposal.

4.4.7 Site Maintenance

The excavation will be covered with polyethylene liner at the end of every day (if the excavation is not completed in one day) to prevent accumulation of any surface run-off. If any water comes into contact with the VOC-impacted soils, that water will be collected by a vacuum truck and disposed of at an appropriate off-site facility. The excavation area will be secured with high visibility fencing and signage during operation. No foot or vehicular traffic will be allowed in the area during the excavation activities. Site controls, including the extent of the exclusion and support zones and the contaminant reduction corridor will be provided in the Health and Safety Plan (HASP).

On a daily basis housekeeping will be maintained at the Site. The Site will be swept every day for any soil tracked into the street or parking lot. At the end of every day the tools will be put back into tool boxes and will be secured with some kind of locking mechanisms. The equipments (e.g. backhoe, geoprobe) will be locked and parked at the dedicated locations on Site.

4.5 Procedures for Decontamination

Proper decontamination is required for all personnel before leaving the site. A decontamination area shall be designated within the Contamination Reduction Zone (CRZ) and an approximate location CRZ is indicated on Figures 3 through 5. The decontamination will be accomplished through a systematic procedure of cleaning and removing personal protective equipment (PPE).

PPE used by personnel such as vinyl/latex gloves or any punctured gloves, coveralls, earplugs, and boot covers will be disposed as regular municipal waste in regular garbage bags. Safety glasses will not be disposed unless they are damaged. The safety glasses will be washed with a solution of water and Alconox and rinsed with clean water. Similarly, the hardhats, boots and earmuffs (if used) will be washed with a solution of water and Alconox and rinsed with clean water.

All construction equipment that comes in contact with contaminated soils must be thoroughly cleaned before leaving the Site. This includes all tools, shovels, heavy machinery, soil compactors, etc. A power washer or steam cleaner and full body PPE will be utilized to clean all heavy machinery. A decontamination pad with a 14-millimeter thick polyethylene sheet will be established in the CRZ. It is anticipated that the equipment to be used for the RA Construction are a Geoprobe, backhoe with a small bucket and a small dump truck. The Geoprobe and the backhoe will be decontaminated with a steam wash on the decontamination pad and all the water will be collected and containerized.

The wash water will be treated on-site. The wash water will be filtered with a bag filter to remove sediments and passed through GAC drums to remove VOCs from the water. After treating the water, a sample will be collected to confirm removal of contaminants and will be analyzed for lead and VOCs. The samples will be collected in laboratory provided containers and will be

shipped to Accutest Laboratory in Dayton, NJ. If the analytical results indicate no exceedances for any contaminants then the water will be discharged to surface on Site.

Any soils found in the dump truck will be swept away prior to leaving the Site.

The detailed procedure for the decontamination of the sampling equipment, field tools and equipment are discussed in the Section 9.5 of the QAPP.

TRC will take precautions to minimize the contact of equipment with the impacted soils. Excavators will work from clean zones to avoid contact between the wheels or tracks and the impacted soils.

4.6 Implementation of Operation and Maintenance Plan

The Operation and Maintenance Plan (OMP) will describe the procedures and activities necessary to operate and maintain the SVE System following RA construction. The OMP will include descriptions of the components of the SVE System; provide procedures for startup, shutdown, normal, abnormal and emergency conditions. The OMP will also discuss the procedures for monitoring the SVE System including frequency of inspections, contingency plans, procedures for repair or maintenance, corrective action, procedures for data management, evaluation, and reporting.

The OMP will be submitted to the EPA for review and comment prior to the completion of construction activities at the Site.

4.7 Construction Schedule

The anticipated time to complete the remedial action construction, which will include installation of the SVE System, excavation of lead- and VOC-impacted soils, backfill and restoration activities is approximately 60 days. An estimated schedule for the remedial action construction is provided in Figure 7.

5.0 CONSTRUCTION QUALITY CONTROL

TRC will conduct inspections, testing and monitoring activities to assure compliance with the terms and conditions of the RDRs. The following section summarizes quality control inspection, control testing for all major field activities, and procedures for documenting and reporting inspections. The requirements for the waste characterization of the soils disposed off-site are also included.

5.1 Quality Control Inspections

As discussed in the Sections 4.3, and 4.4 of the CQAPP, the quality assurance inspections will be conducted on a daily basis. These sections from the CQAPP discuss the methodology (how and what to inspect) for the quality assurance inspections. The quality control inspection is an on-going process which will be implemented on a continuous basis during all RA construction. This section will discuss the procedures for the quality control inspection, which will be implemented in the field.

5.2 Quality Control Testing

This section summarizes the control testing procedures that will be implemented in the field for each task for the remedial action construction. The control testing in the field will be conducted by a qualified person and in accordance with the standard.

5.2.1 SVE Wells and Vapor Probes

The SVE wells and the VPs will be installed by a New Jersey licensed driller. They will be installed in accordance with the approved RDR and New Jersey Regulation Well Construction and Maintenance; Sealing of Abandoned Wells (N.J.A.C. 7:9D). A qualified and experienced TRC field engineer will oversee the installation of the SVE wells and VPs. TRC has selected a contractor, East Coast Drillers Incorporated (ECDI) to install the SVE wells and VPs at Building 12. ECDI is a New Jersey licensed drilling company from Moorestown, New Jersey. A copy of the master driller license for the company's owner is included in Appendix B.

During the installation of the SVE wells and VPs the TRC inspector will log the following items in the field for quality control purposes:

- The soil types encountered
- Total depth drilled
- Length of well screen and riser
- The volume and type of sand pack, and
- The volume and composition of grout used on every well as the primary quality control measure.

Detailed logs of each well will be generated and provided in the RAR, as indicated in Section 5 of CQAPP.

5.2.2 Trenching and Piping

Trenching

The trenching activities will be conducted at the Building 12 property to install the piping for the SVE System. The trenching will be conducted as discussed in Section 2.1. The details for the backfilling operation are provided on Details 6A and 6B in Figure 6. The backfill will be placed in the trench in lifts coinciding with the dimensions provided in Figure 6. A grading layer of stone will be placed and lightly compacted, followed by the installation of piping and bedding material stone. The bedding material will be lightly compacted, to avoid damage to the piping. Native soil will be placed over the bedding material and lightly compacted in preparation to receive sub-base and asphalt.

If utilities are encountered during the trenching activity the TRC engineer will make necessary arrangements to secure and protect the utility and/or make modifications to the piping route. These arrangements will be made in the field. Any change in the design will be recorded in the as-built figures and noted in the RAR.

During the trenching activities the TRC engineer will conduct the following field activities for quality control purposes:

- Record any changes in the trench route on the Site plan and in the field book,
- Record any variations made with the trench depth on the Site plan and in the field book,
- Record the reasoning/explanation for the changes made in the route or depth, and
- Measure and confirm the thickness of each backfill material (e.g. bedding material, native material, sub-base and asphalt) placed into the trench with the design.

Any modifications made with the trench specification in the field from the original design will be provided in the as-built and included in the RAR.

Piping

The piping for the SVE system will be installed overhead inside the building and in the trench outside the building. The piping will be installed by an experienced contractor. A qualified and experienced TRC engineer will oversee the installation and testing. The pressure testing will be conducted by the sub-contractor to confirm that there are no leaks in the pipe. The testing will be conducted as indicated in the Section 5.0 of the CQAPP.

During the installation of the piping the TRC engineer will conduct the following field activities for quality control purposes:

- Record the piping route on the Site plan,
- Record types and number of pipe fittings in the field books,
- Record the approximate location of pipe hangers on the Site plan for the overhead piping, and
- Conduct pressure testing for every 100 linear feet installed.

Any modifications from the original design made to the piping construction in the field will be provided in the as-built and will be included in the RAR.

5.2.3 Excavation

The excavation activities will be conducted to remove VOC- and lead-impacted soils at the Building 13 and Building 12 properties, respectively. The excavations will be conducted as discussed in Section 2.2. During excavation, different materials (e.g. asphalt, sub-base and soil) will be segregated and stored separately as discussed in Section 4.0 of this report. The excavation will be conducted in lifts and the sidewalls will be sloped (2:1) where possible and where required to prevent failure and the collapse of clean soil into the excavation. The excavation will be conducted by an experienced sub-contractor.

A TRC geotechnical engineer/technician will oversee and direct the excavations to prevent any slope failures and damage to the foundations of Building 12, the temporary shed at Building 13 or the Quonset Hut. Utilities found in the excavation will be protected and secured from damage. The TRC engineer and/or sub-contractor will make the necessary arrangements to secure the utility line in the excavation area.

The excavation will be back-filled with the approved RCA or alternatively, quarry processed DGA material. The acceptance procedure for RCA or DGA as the backfill material at the Site will be in accordance NJDEP's Clean Fill Guidance. The contractor will be required to provide documentation including analytical results that the RCA or DGA is approved for unrestricted use in New Jersey. The backfill material will be temporarily stored on-site a sufficiently distance from the excavation to prevent slope failure. The backfill material will be used to backfill the excavation as, and when needed. The backfill material will be placed in 1-foot lifts and will be compacted with a plate compactor.

The sub-contractor will be responsible for compacting each layer to 90% of the maximum dry density as determined by Method C of ASTM D1557 (Proctor Tests) for that soil. The sub-contractor will be responsible for providing the dry unit weight vs. moisture content curve through independent testing as provided by the material source. TRC will test the moisture content and dry unit weight in the field to ensure proper compaction. The contractor may be required to add fresh water to the RCA or DGA to achieve 90% compaction. Potable water will be used, if required. TRC will confirm the compaction with a nuclear density gauge. The TRC

engineer will be ‘Nuclear Gauge Safety’ certified to operate the nuclear gauge in the field. In addition, the TRC engineer will wear a Film Badge Dosimeter while operating the nuclear gauge in the field to measure any radiation leaks from the gauge.

During the excavation and backfilling activities the TRC engineer will conduct the following field activities for quality control purposes:

- Will direct excavation to prevent any slope failures and damage to the foundations;
- Record any changes in the excavation footprint on the Site plan and in the field book;
- Measure density for every 1 foot of backfill material placed; and
- The results of compaction testing will be recorded in the field book for each excavation.

The compaction testing results and any changes in the excavation footprint will be provided in the as-built and included in the RAR.

5.3 Submittals and Schedule

Prior to commencing the construction activities the appointed sub-contractor will be responsible to provide the submittal to TRC for approval. The submittals will include the information on the product, product specification, manufacturer, supplier, warranty/guarantee information, Material Safety Data Sheets (if applicable) and any special safety requirements. The sub-contractor will not import any material until the submittal is approved by TRC. The TRC field engineer will verify and confirm the information product received at the Site is in accordance with the approved submittal.

The construction schedule (Figure 7) identifies the type, submission dates and approximate approval dates for each submittal.

5.4 Reporting

The field coordinator will be responsible to maintain all the field records in the field. The field coordinator will hand over the field records to the Field Team Leader on a daily basis.

Refer to Section 5.0 of CQAPP for details on the reporting procedures, frequency of reporting and reporting formats.

5.5 Waste Characterization

During the delineation effort a waste characterization sample (5-point composite) was collected from the lead-impacted soil excavation footprint, located at the Building 12 property. The sampling results will be used for the disposal purposes. If required, TRC will collect any

additional waste characterization samples for the disposal of lead-impacted soil. The samples will be collected in-situ or while excavating the lead-impacted soil.

During the delineation effort two waste characterization samples were collected from the VOC-impacted soil excavation footprint located at the Building 13 property. These samples were never analyzed and were discarded because these samples did not represent the proposed excavation material, as they were collected at a depth below the proposed excavation. Soil sample/s for waste characterization purposes will be collected prior to or during the excavation activity/Remedial Action phase and will be analyzed in accordance with the disposal facility's protocol.

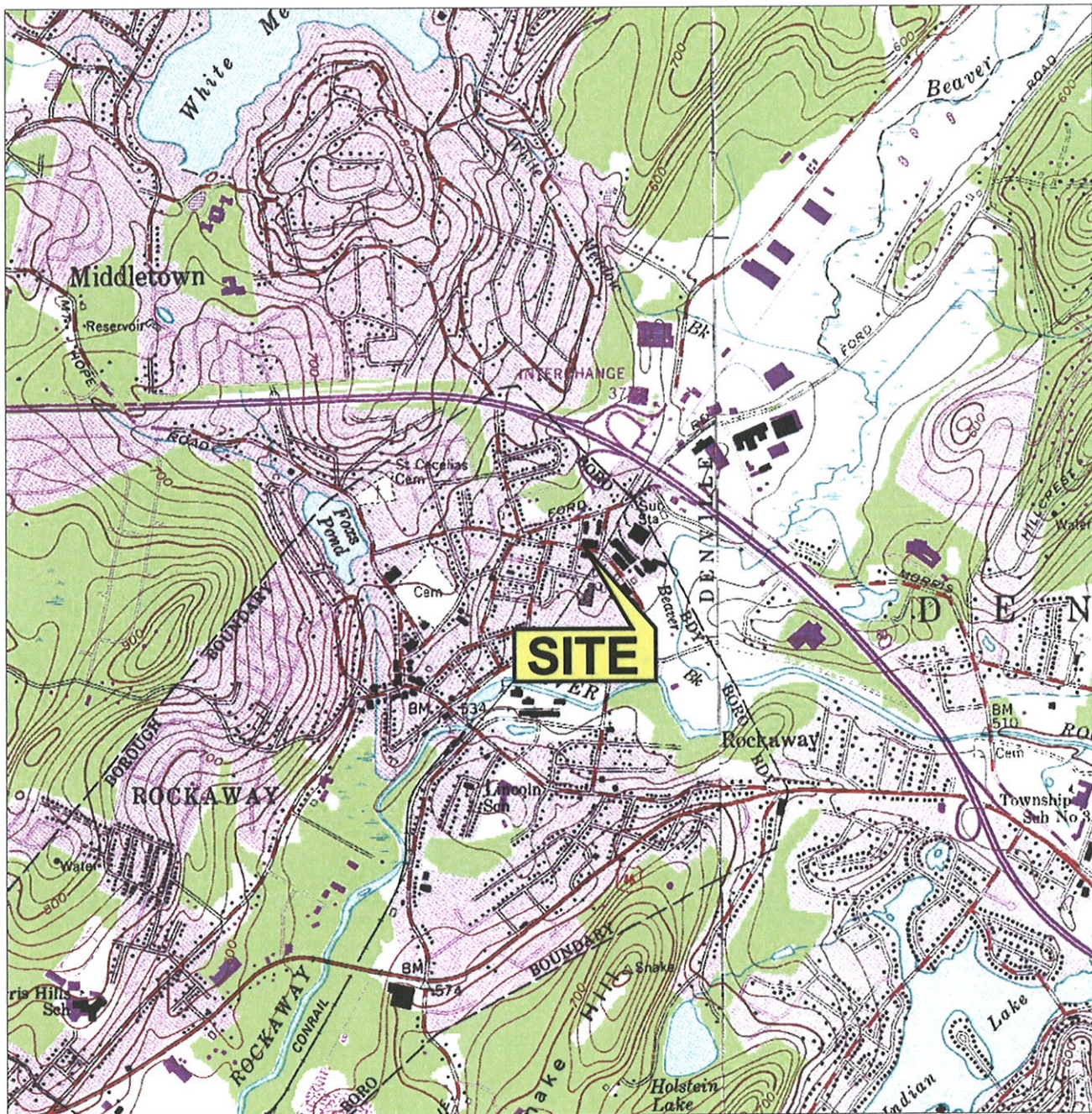
If required, waste characterization samples will be collected from the drill cuttings and trench spoils stored in drums and roll-offs/temporary stockpile, respectively. The sample will be collected from the drums and roll-offs/temporary stockpile in accordance with the disposal facility's protocol.

Note: On October 12, 2012 TRC collected composite soil samples from the proposed lead and VOC-impacted soils excavation footprint located in Building 12 and Building 13 properties, respectively, for waste characterization purposes. Upon receipt of the analytical results from the laboratory TRC will submit it to the EPA in the next MPR.

6.0 REFERENCES

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- US Environmental Protection Agency, March 2010. “Green Remediation Best Management Practices: Soil Vapor Extraction & Air Sparging”. OSWER EPA 542-F-10-007

FIGURES



SOURCE: DOVER AND BOONTON, N.J. QUADRANGLES, 1954, PHOTOREVISED 1981
7.5 MINUTE SERIES (USGS TOPOGRAPHIC MAP)



TRC ENVIRONMENTAL CORP.
57 East Willow Street
Millburn, New Jersey 07041

SITE LOCATION MAP

KLOCKNER PROPERTY – ROCKAWAY, NJ

JOB NO.: 163292

BJ/LB

DATE: JANUARY 2010

FIGURE: 1



0 2000 FT.
APPROXIMATE SCALE




QUADRANGLE LOCATION



LEGEND

--- SITE PROPERTY LINE



 **TRC ENVIRONMENTAL CORP.**
57 East Willow Street
Millburn, New Jersey 07041

SITE PLAN

KLOCKNER PROPERTY - ROCKAWAY, NEW JERSEY

JOB NO. 163292

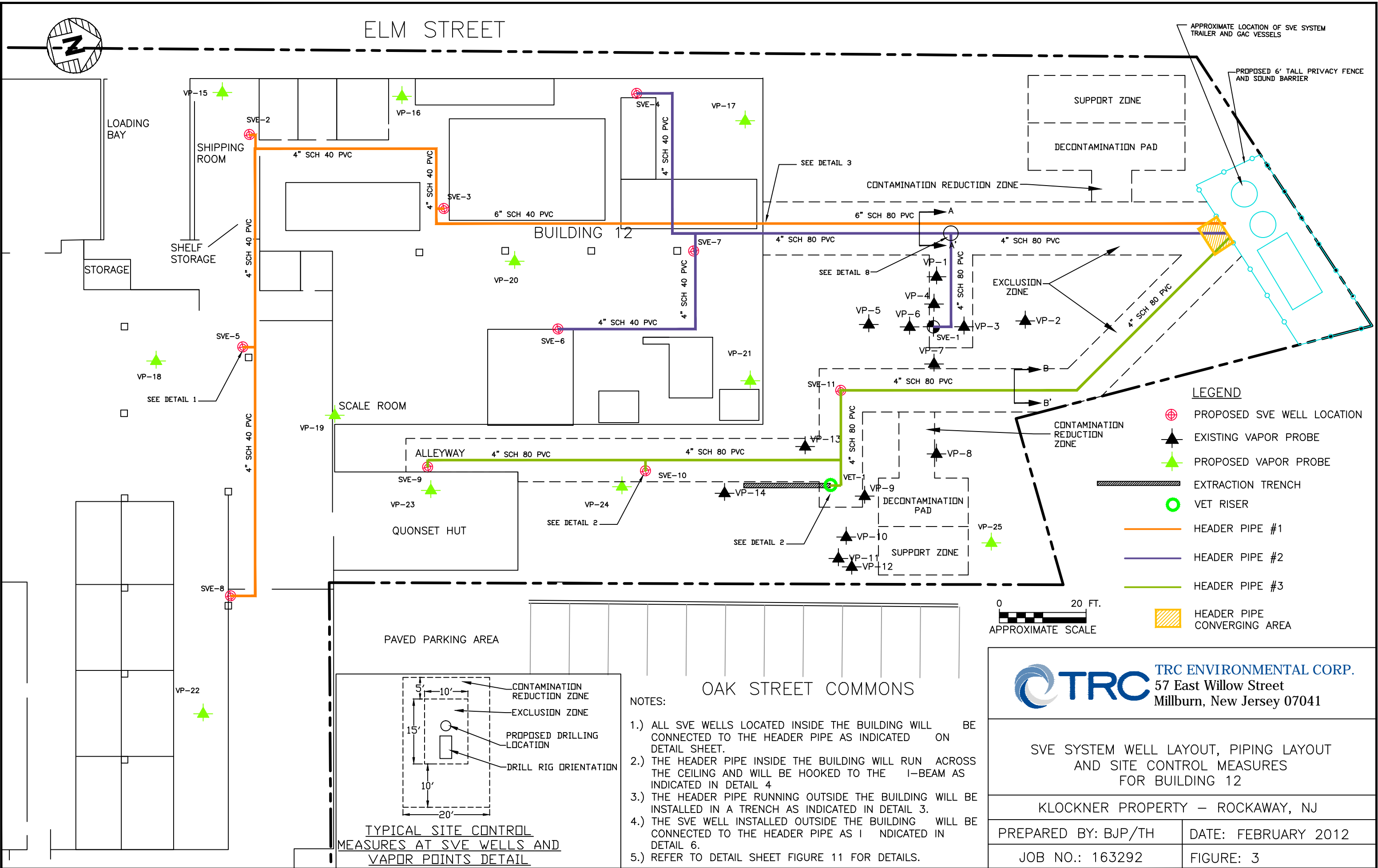
BJP/TH

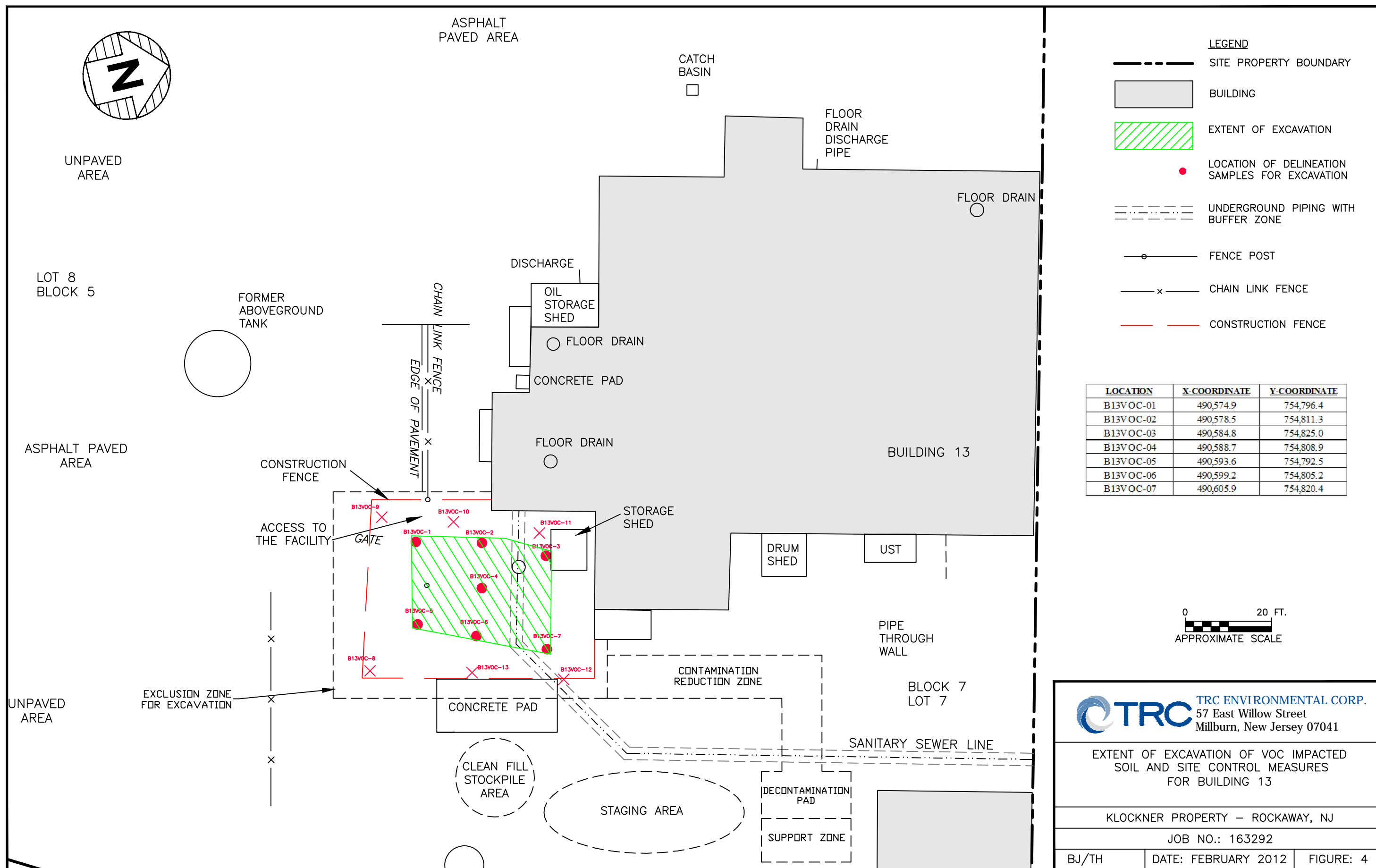
DATE: MARCH 2012

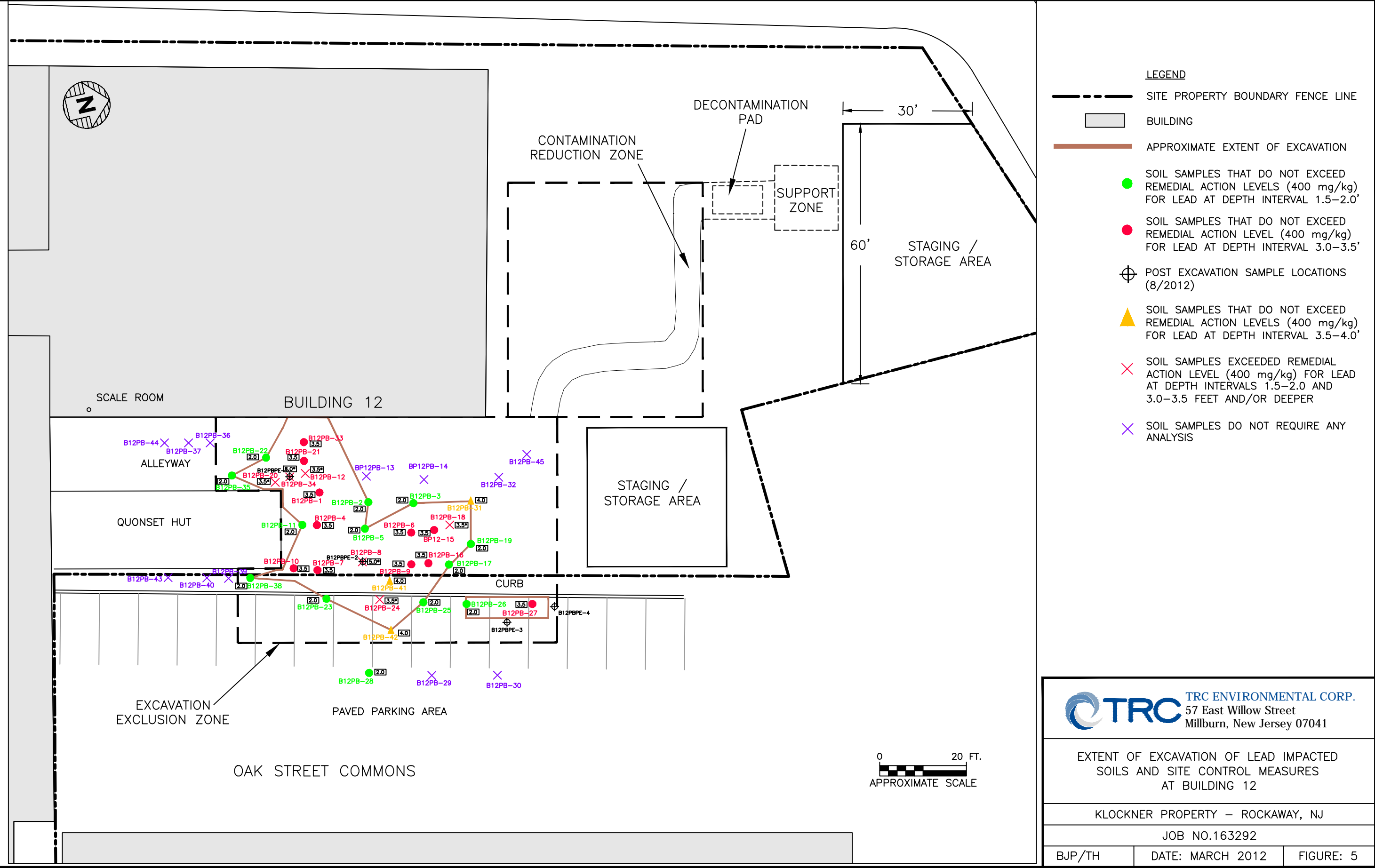
FIGURE: 2

ELM STREET

OAK STREET COMMONS

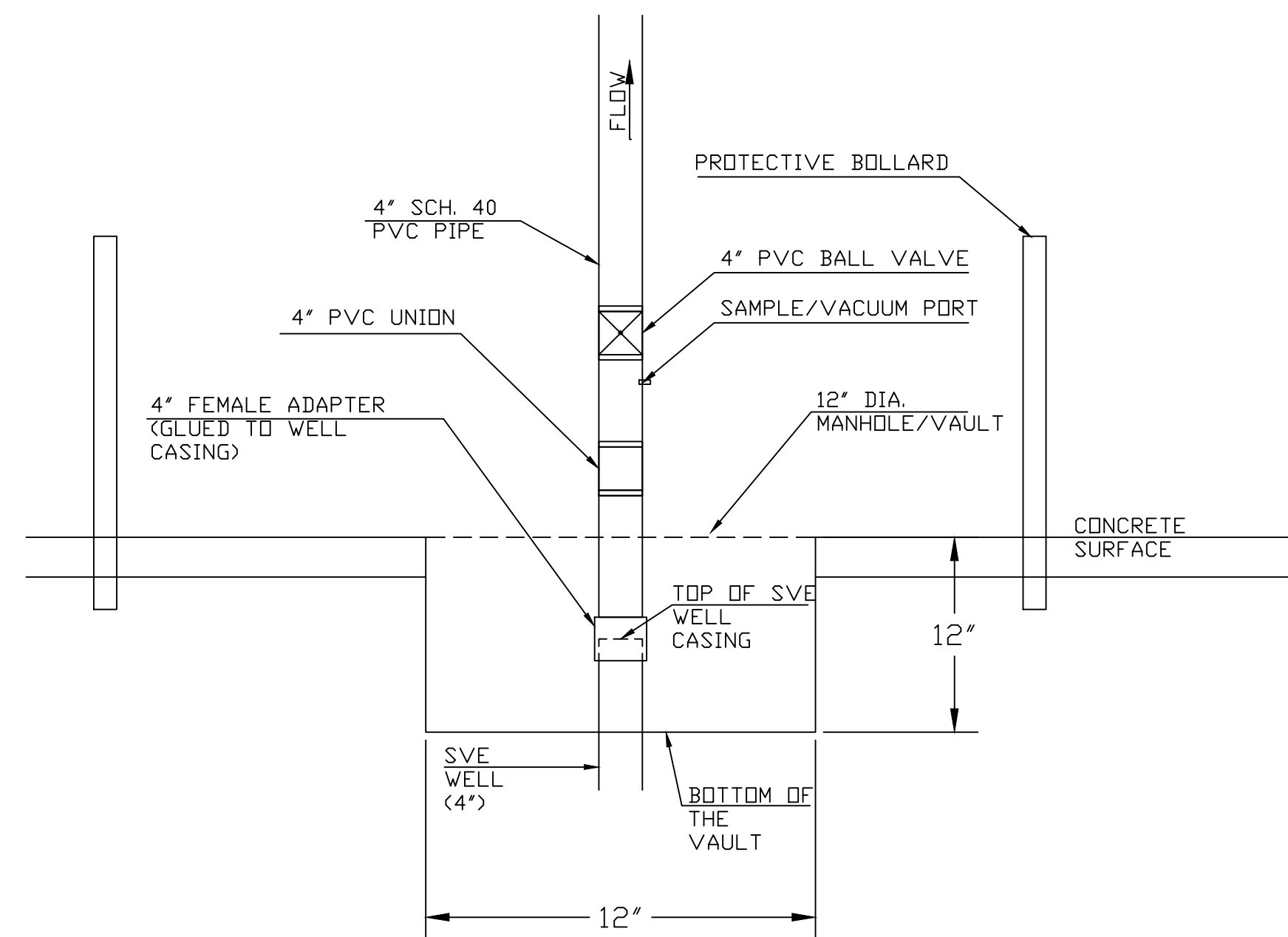






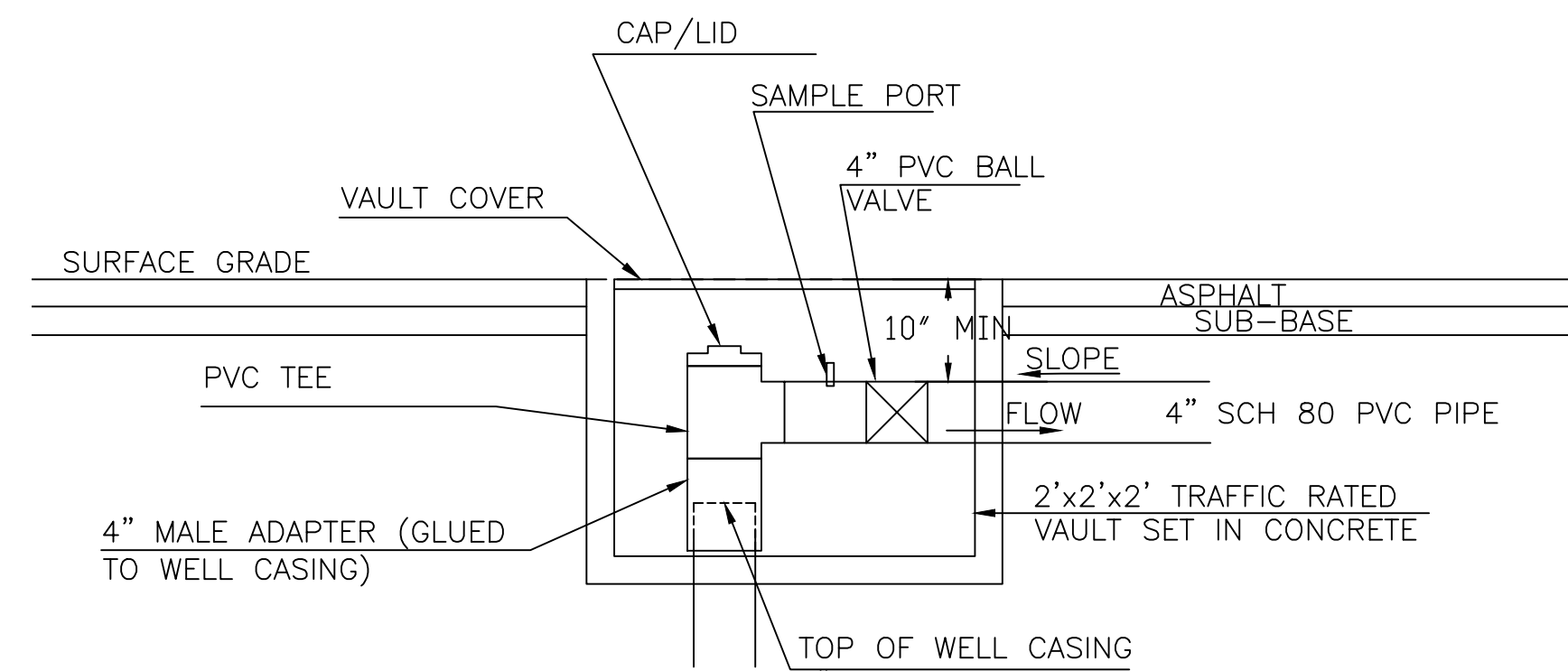
DETAIL 1

INTERIOR SVE WELL COMPLETION
NOT TO SCALE



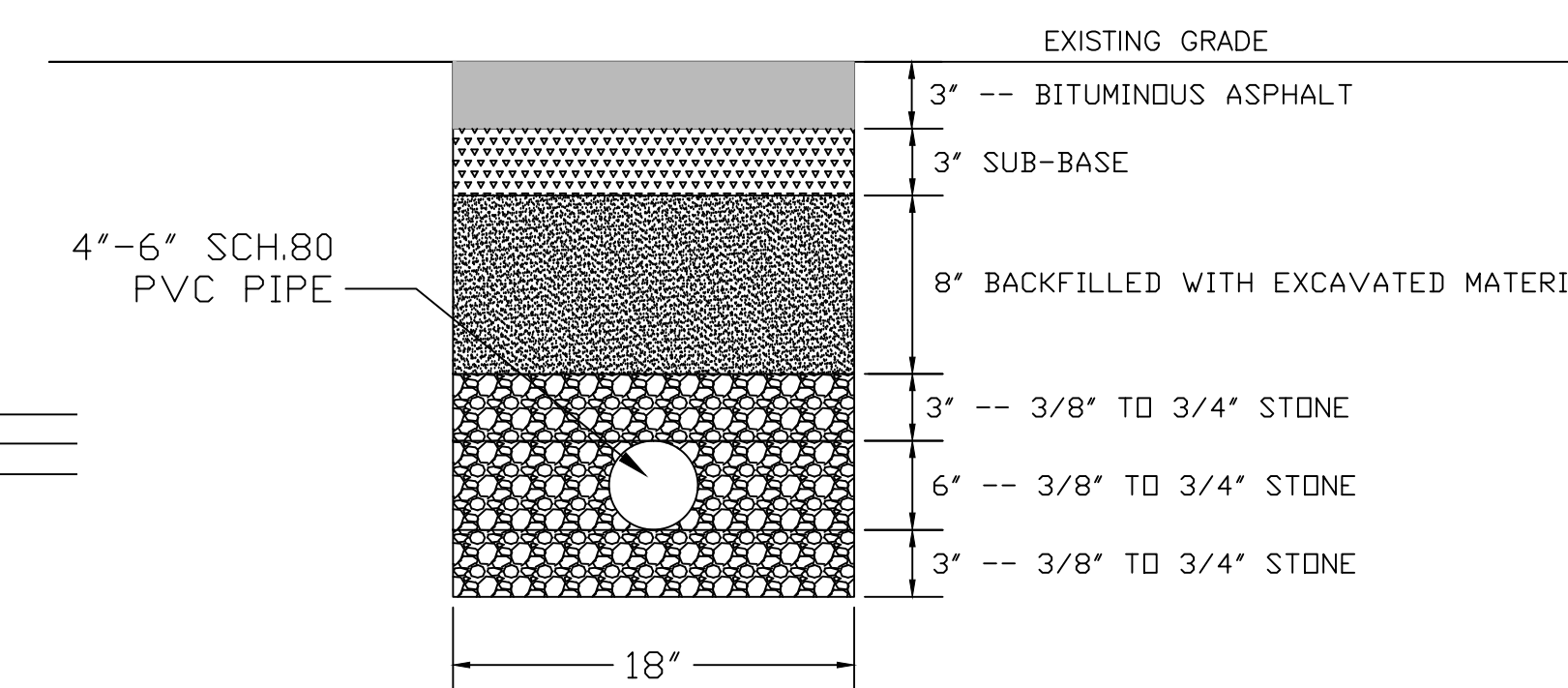
DETAIL 2

EXTERIOR SVE WELL COMPLETION
NOT TO SCALE



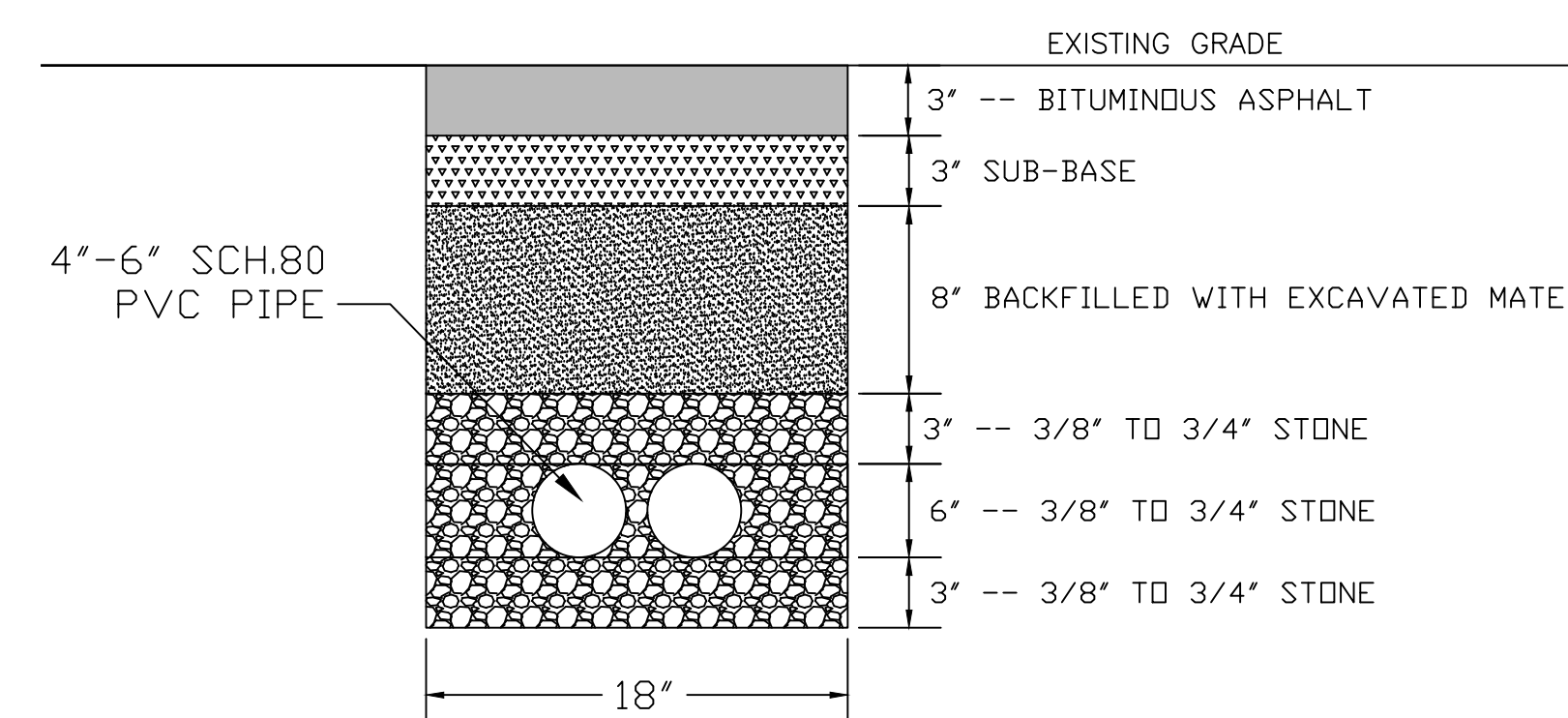
DETAIL 6A

CROSS SECTION A-A' OF TRENCH RESTORATION



DETAIL 6B

CROSS SECTION B-B' OF TRENCH RESTORATION

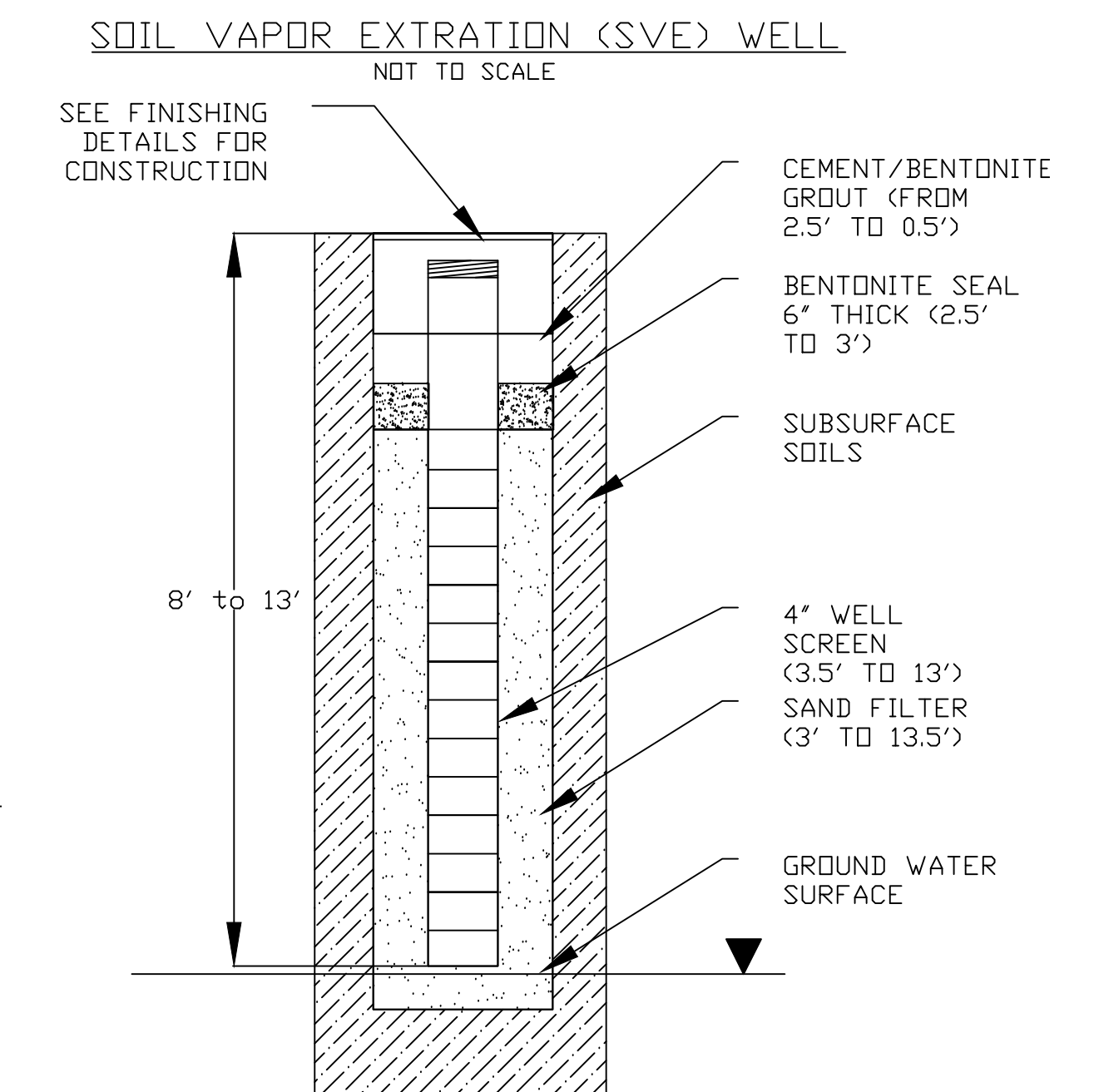


NOTES:

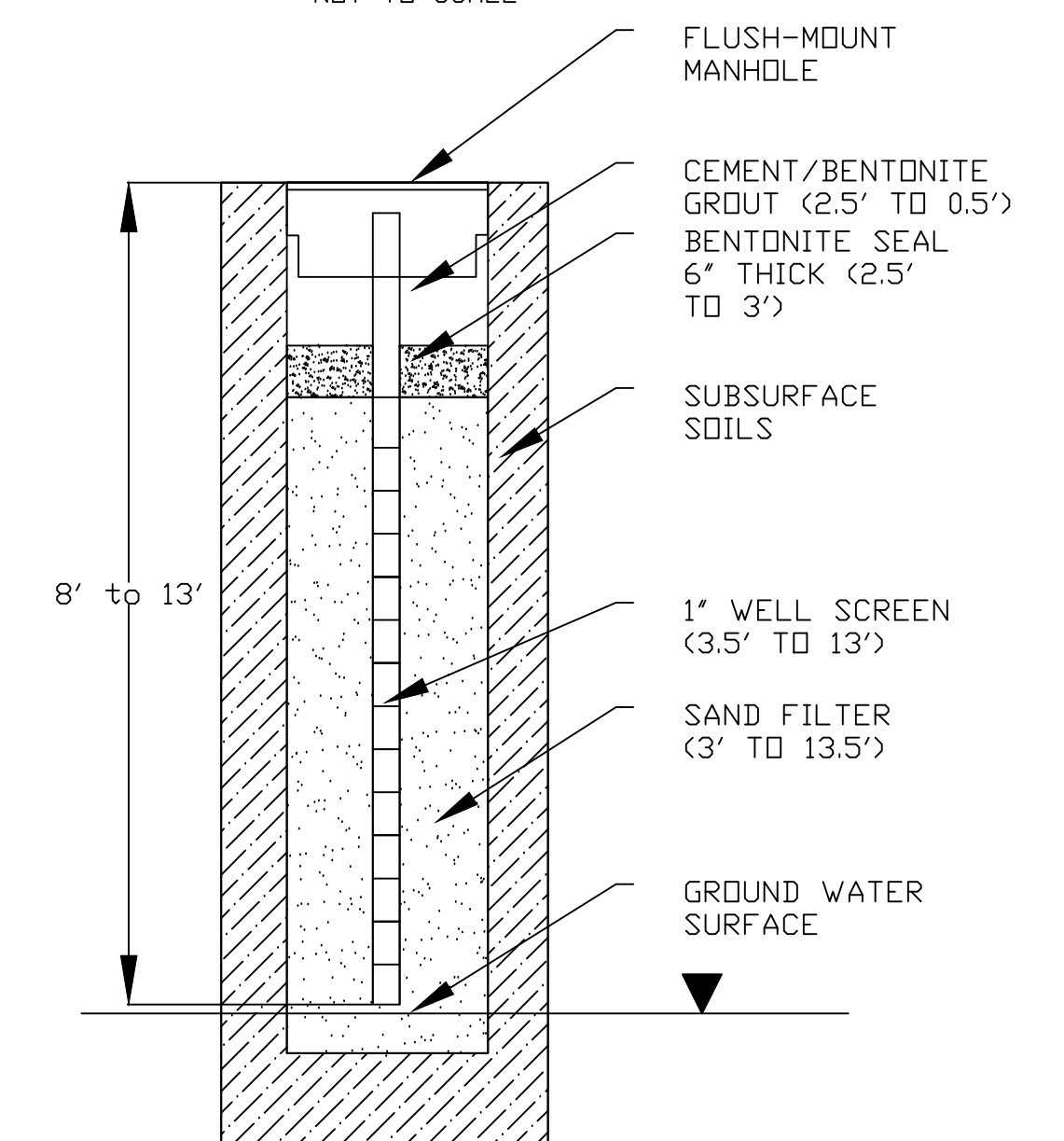
- 1.) ASPHALT TO BE SAW-CUT PRIOR TO EXCAVATION.
- 2.) SUB-BASE MATERIAL TO BE SEGREGATED FROM THE NATIVE SOIL AND WILL BE REUSED DURING RESTORATION.
- 3.) EXCAVATED NATIVE MATERIAL TO BE STAGED NEXT TO THE TRENCH AND USED AS BACK FILL. THE EXCESS MATERIAL WILL BE TEMPORARILY STORED ON-SITE IN A PLASTIC LINED ROLL-OFF AND COVERED WITH A WATERPROOF TARP.
- 4.) TRENCH BACKFILL TO BE LIGHTLY COMPACTED WITH A PLATE COMPACTOR.
- 5.) ACTUAL ASPHALT THICKNESS TO MATCH EXISTING.
- 6.) ALL PIPING TO BE 4" and 6" SCHEDULE 80 PVC IN THE TRENCH.

DETAIL 7

SVE WELL AND VP CONSTRUCTION DETAILS
NOT TO SCALE

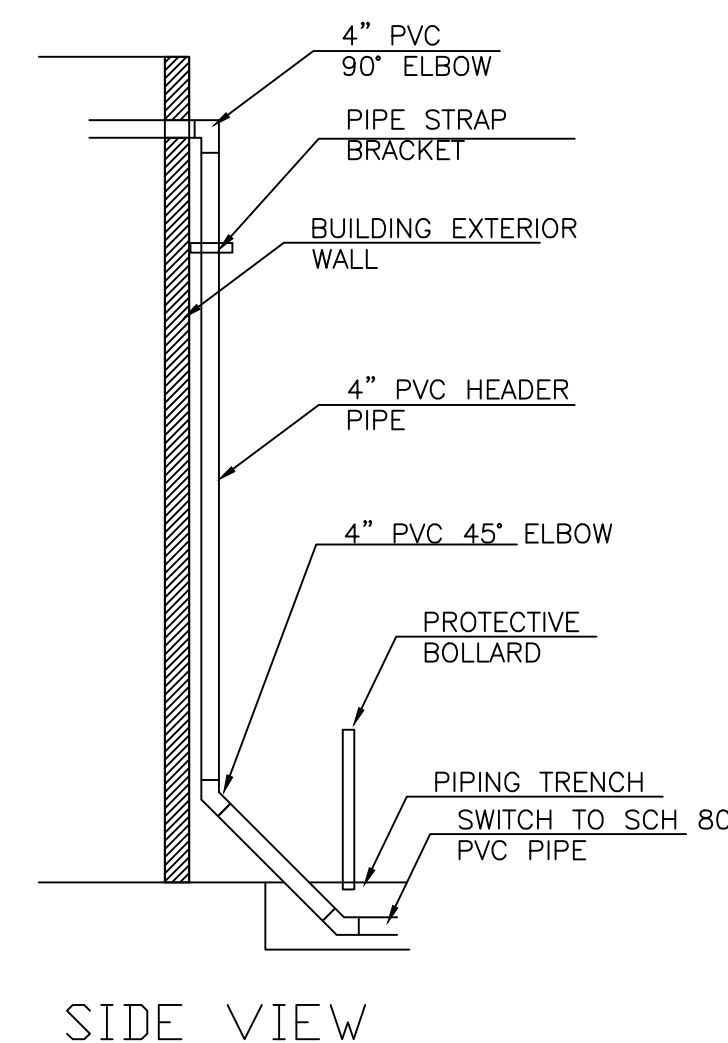
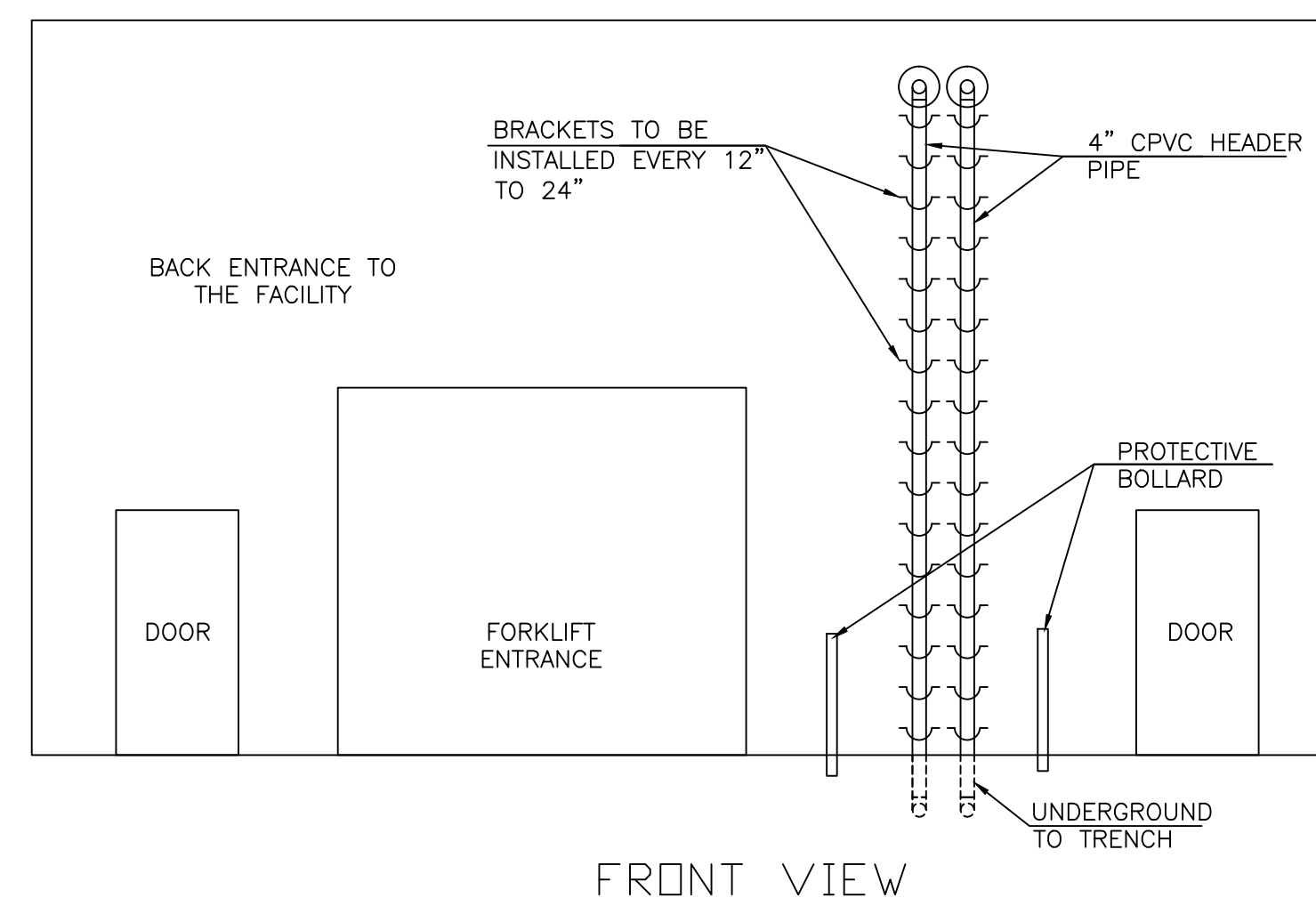


VAPOR PROBE



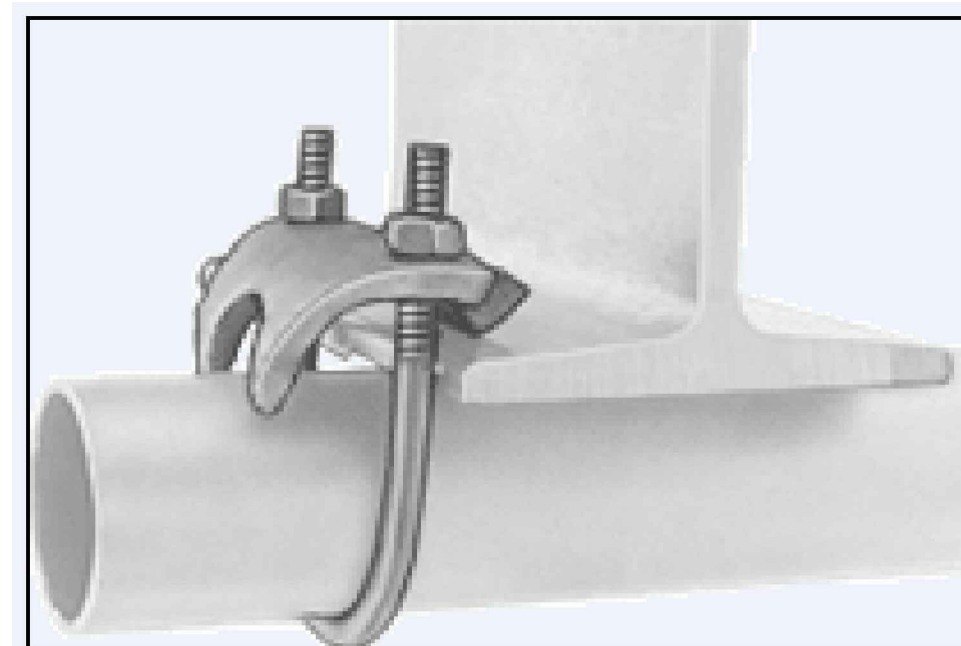
DETAIL 3

SVE HEADER PIPE WALL PENETRATIONS AND TRENCH ENTRANCE
NOT TO SCALE



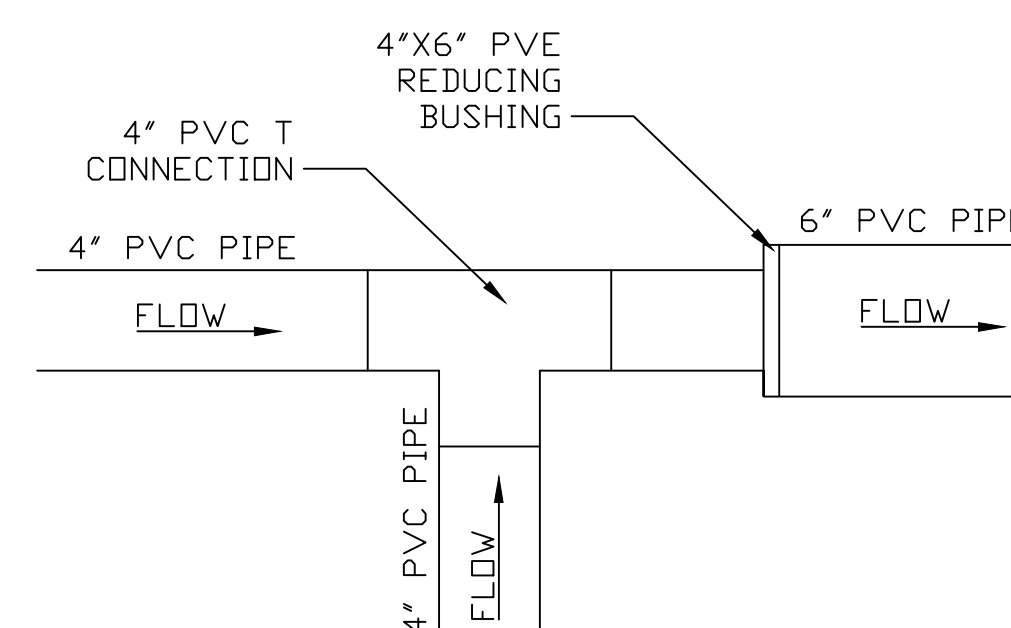
DETAIL 4

INTERIOR PIPE HANGER EXAMPLE
NOT TO SCALE



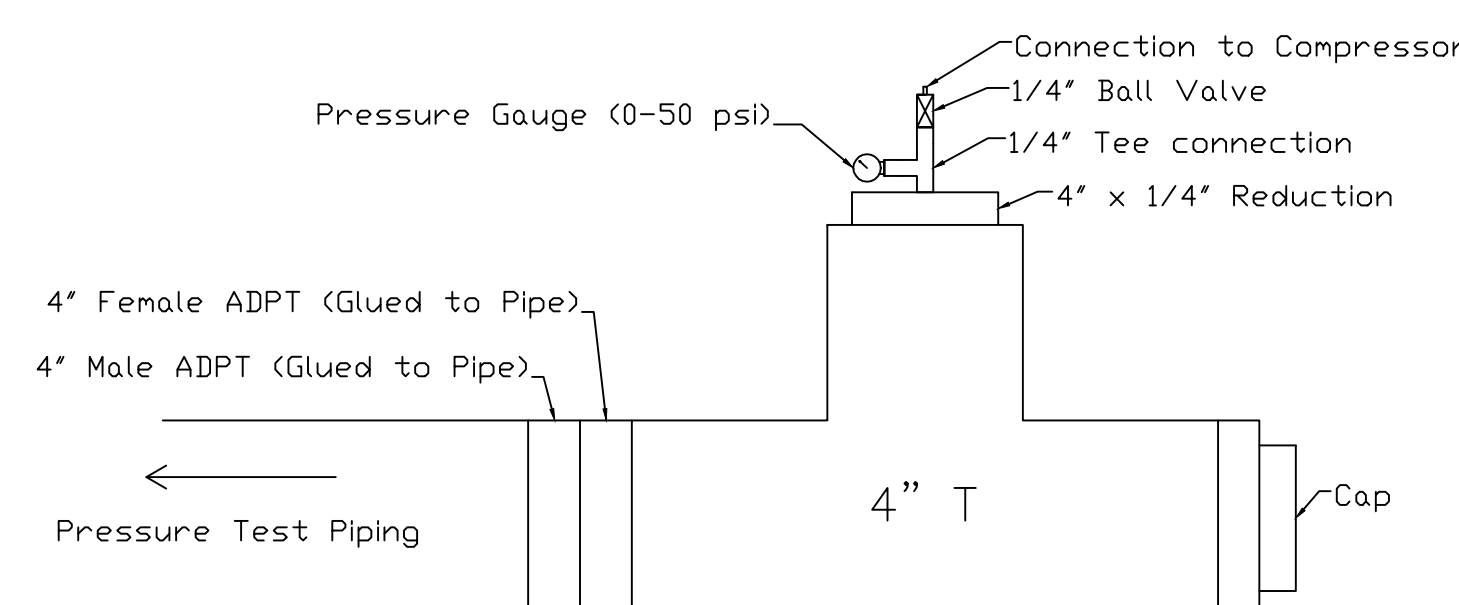
DETAIL 8

PIPE ENLARGEMENT DETAIL
NOT TO SCALE



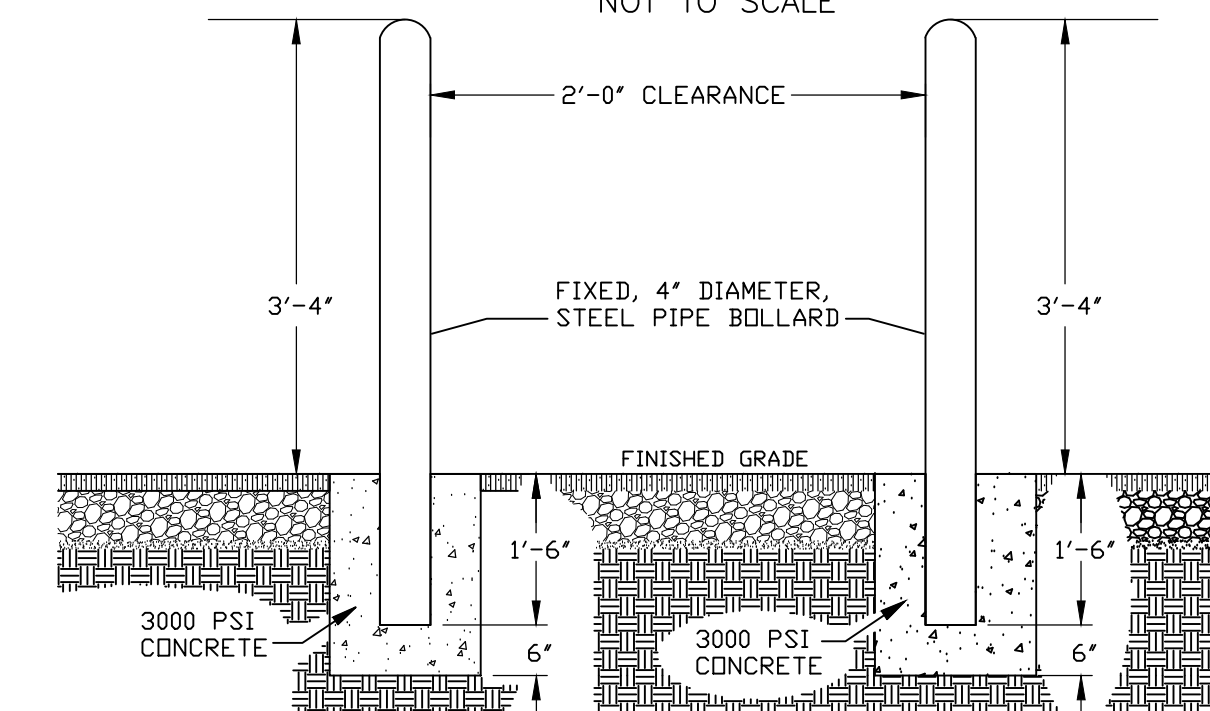
DETAIL 9

'T' FOR PRESSURE TESTING PIPE
NOT TO SCALE



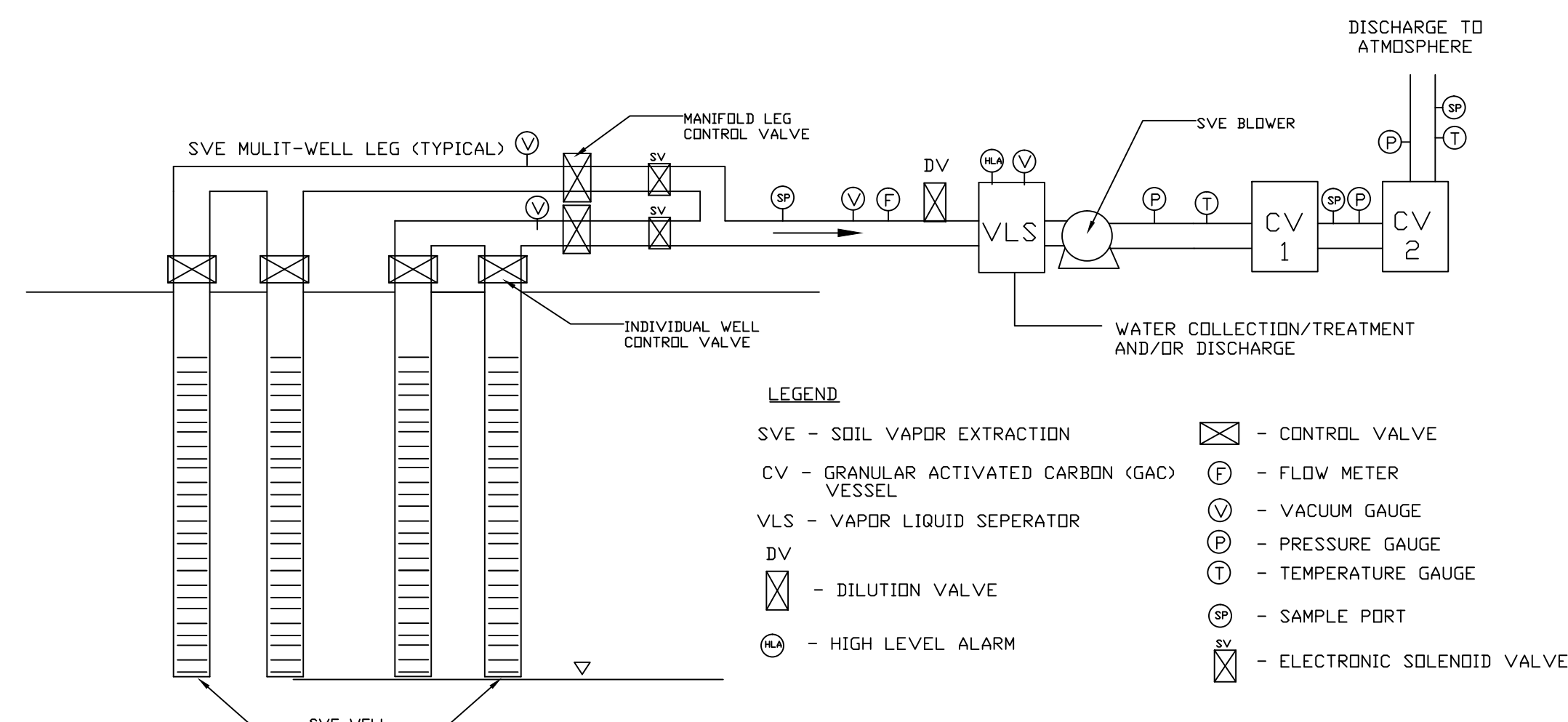
DETAIL 10

CONSTRUCTION DETAIL FOR BOLLARD
NOT TO SCALE



DETAIL 5

SVE SYSTEM PROCESS FLOW DIAGRAM



LEGEND

- SVE - SOIL VAPOR EXTRACTION
- CV - GRANULAR ACTIVATED CARBON (GAC) VESSEL
- VLS - VAPOR LIQUID SEPARATOR
- DV - DILUTION VALVE
- HA - HIGH LEVEL ALARM
- Control Valve
- Flow Meter
- Vacuum Gauge
- Pressure Gauge
- Temperature Gauge
- Sample Port
- Electronic Solenoid Valve

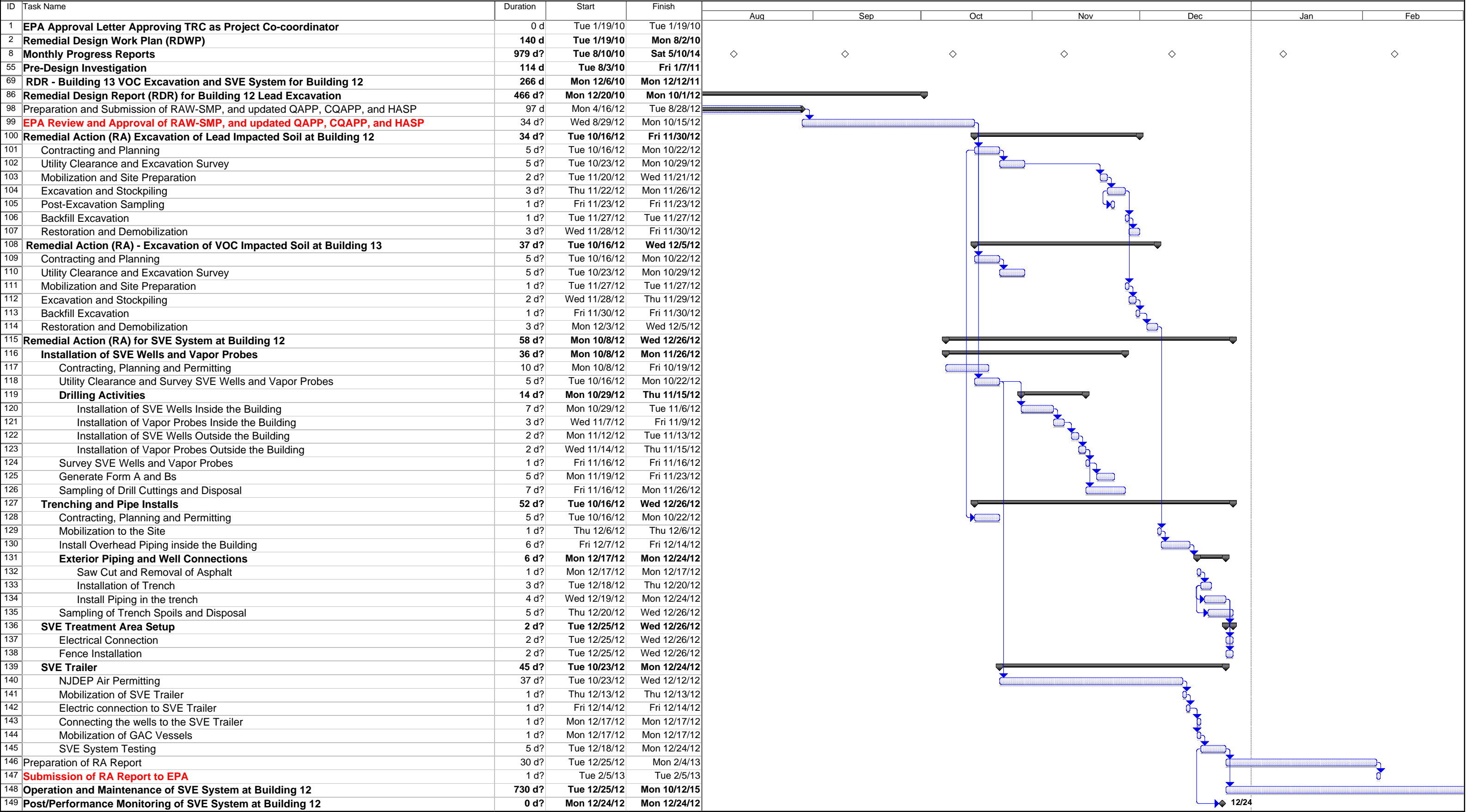
TRC TRC ENVIRONMENTAL CORP.
57 East Willow Street
Millburn, New Jersey 07041

CONSTRUCTION DETAILS
SVE TREATMENT SYSTEM

KLOCKNER PROPERTY - ROCKAWAY, NJ

PREPARED BY: HFN/TM DATE: MARCH 2012
JOB NO.: 163292 FIGURE: 6

FIGURE 7
CONSTRUCTION SCHEDULE
OPERABLE UNIT 3 - KLOCKNER AND KLOCKNER
BOROUGH OF ROCKAWAY, NEW JERSEY



Note: 1) Durations shown are in work days
2) A complete view of the time bars for ID # 1 through 99 are pertaining to the pre-design investigation and preparatory phase, and has been presented in previous reports.

Figure 7 Construction Schedule.mpp

TABLE 1
PERSONNEL RESPONSIBILITIES AND QUALIFICATION TABLE
ROCKAWAY BOROUGH WELL FIELD SUPERFUND SITE
KLOCKNER AND KLOCKNER SOURCE AREA - OPERABLE UNIT 3
BOROUGH OF ROCKAWAY, NEW JERSEY
TRC PROJECT #163292

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Nidal Rabah	Program Manager	TRC	Oversees project and primary contact with EPA	See Resume, Appendix A
Howard Nichols	Deputy Project Manager/Project Engineer	TRC	Manages project – coordinates field team and subcontractors.	See Resume, Appendix A
Bhuvnesh J. Parekh	Field Team/QA Manager	TRC	Supervises all field activities	See Resume, Appendix A
Brian Ross	Field Coordinator/Site Safety Officer	TRC	Coordinates all field activities in the field	See Resume, Appendix A
Jim Duffy	Sub-contractor	East Coast Drilling Inc.	Install Well	See License, Appendix B
To Be Determined (TBD)	Sub-contractor	TBD	Installation of trench and piping	Not Applicable
TBD	Sub-contractor	TBD	Excavation of Lead and VOC impacted soils at Building 12 and 13, respectively	Not Applicable

APPENDIX A

RESUMES

NIDAL RABAH, PhD, PE, PMP

EDUCATION

Ph.D., Environmental Engineering, Stevens Institute of Technology, 1989
M.E., Civil & Environmental Engineering, Stevens Institute of Technology, 1984
B.Sc., Civil Engineering, Damascus University, 1981

PROFESSIONAL REGISTRATIONS

Professional Engineer, Delaware, (#8363), 1992
Professional Engineer, New Jersey, (#GE45777), 2005
Professional Engineer, New York, (#082813-1), 2005
Project Management Professional (PMP), PMI-USA, (#245011), 2005
NJDEP UST Certification Subsurface Evaluation, Closure & Testing, (#291643), 2006
OSHA 40-Hour HAZWOPER, 1988; OSHA 8-Hour Refresher HAZWOPER, 2005

AREAS OF EXPERTISE

Dr. Nidal Rabah serves as TRC's New Jersey Director of Engineering. He is responsible for the development and implementation of soil and groundwater remedial strategies and remedial system designs, and management of construction projects. He also serves as an expert on litigation support projects.

Dr. Rabah has more than 20 years of professional and academic experience in:

- Remedial Design & Engineering and Groundwater Modeling
- Brownfield Redevelopment & Environmental Construction Management
- Landfill Engineering & Closure
- Water Resources Planning & Engineering
- Litigation Support

REPRESENTATIVE EXPERIENCE

Dr. Rabah is experienced in the planning, development and management of large-scale, multi-faceted environmental remediation engineering projects. He led complex environmental remediation and Brownfields redevelopment programs at numerous industrial, commercial and public facilities, utilities & MGP facilities, airports, landfills, and petrochemical facilities including fuel terminals, refineries, and retail service stations under various state and federal regulatory programs (NJDEP, NYSDEC, PADEP, and USEPA). He served as a program manager on many multi-million dollar environmental remediation programs and term-contracts for public and private clients.

Dr. Rabah has extensive experience in groundwater modeling and in the design, implementation and operation, maintenance & monitoring (OM&M) of numerous soil and groundwater remedial techniques. He managed numerous remediation

projects that involved closure of aboveground and underground storage tanks (AST/UST), air quality monitoring and compliance and vapor intrusion control.

He managed large international infrastructure development, capacity building and strategic planning projects for water, wastewater, and solid waste for various international agencies/institutions.

Remedial Planning, Modeling, Design & Engineering

Confidential Clients, Petrochemical Facilities (Refineries, Terminals, Plant) – Multiple Sites in NJ, (Project Director: 2005 – present)

Dr. Rabah directs RI/FS, modeling, remedial designs, and remediation construction to address soil and overburden/bedrock groundwater dissolved and free product (NAPL and tar) impacts. Remedies included soil removal/treatment and stabilization, permeable reactive barriers (PRBs and Biowalls), cutoff walls/containment (steel and geomembrane sheet piles), pump-and-treat, capping (soil, and low permeability geosynthetic and asphalt), passive and active product recovery (skimming, bailing and vacuum extraction) and in-situ bioremediation.

Newport Center, Jersey City, New Jersey (Project Director: 2005-present)

Dr. Rabah is responsible for the design and implementation of the remedial action to address soil and multi-aquifer groundwater impacts at a former MGP site with coal tar and petroleum hydrocarbon contamination. The project includes the design and implementation of treatability and pilot scale testing, groundwater modeling of a complex overburden-bedrock aquifer system, design and implementation of a full-scale extensive product recovery and groundwater pump-and-treat systems and sediment remediation. Ongoing remedial actions include LNAPL and coal tar DNAPL recovery using skimmers and total fluid recovery systems.

Mallinckrodt Baker, Inc., Manufacturing Facility, Phillipsburg, New Jersey (Project Director: 2006)

Dr. Rabah led the value engineering and performed groundwater flow modeling and hydraulic analysis of groundwater-surface interaction to expand a 3,500-gpm groundwater remedial pumping system to remediate chlorobenzene and other volatile organic compounds in a few hundreds deep multi-aquifer overburden and limestone bedrock system.

Englishtown Industrial Park, former utensils industrial facility, Englishtown, New Jersey (Project Director: 2005 – present)

Dr. Rabah directs RI, remedial design and remedial action implementation to remediate groundwater impacts with chlorinated solvents, free floating fuel oil, and base neutral impacts. Remedial actions include in-situ bioremediation, high vacuum

extraction for product recovery, and soil vapor extraction. Dr. Rabah developed and directed the implementation of treatability and pilot test programs of in-situ bioremediation using emulsified vegetable oils for reductive dechlorination, sodium bicarbonate for pH adjustment, and Dehalococcoides for bioaugmentation. The full scale field in-situ bioremediation program is facilitated using pneumatic fracturing and fluid atomized injection.

Shieldalloy Metallurgical Corporation, former manufacturing facility, Newfield, New Jersey (Project Director: 2006 – present)

Dr. Rabah directs the groundwater remedial program to remediate a dissolved chromium, chlorinated solvent, and Perchlorate plumes that are a few miles long within a 120-foot deep multi-aquifer system. Dr. Rabah is responsible for the design and implementation of laboratory treatability and field pilot scale testing programs as well as the design and implementation of the full scale remedial action. The remedial technologies included in-situ biological and chemical reduction using emulsified vegetable oils, micro-, nano-scale, and emulsified zero valent iron (ZVI). The design of the in-situ remedial program is underway and relies pneumatic fracturing and fluid atomized injection as well as sonic drilling techniques to facilitate the electron donor injection.

Former Dry Cleaners, multi-sites at shopping centers, New Jersey (Project Director: 2006 – present)

Dr. Rabah is responsible for the design and implementation of pilot and full scale in-situ bioremediation (EOS and SRS) and chemical oxidation (permanganate) remedial programs to address dissolved and residual chlorinated solvent impacts within various aquifer systems.

Former Gulton Industrial Facility, Metuchen, NJ (Project Director: 2006 – present)

Dr. Rabah is responsible for the design and implementation of pilot and full scale in-situ reductive dechlorination and hotspot soil excavation and disposal to address dissolved and residual chlorinated solvent impacts within multi-aquifer system. The selected electron donor is a mixture of plant matter and nutrients with micro scale zero valent iron (ZVI).

AMB, Multi-Warehouse Redevelopment Sites – NJ (Project Director: 2006)

He directed investigations, design and construction of sub-slab vapor control systems under new large commercial warehouses and residential developments.

Centex Homes, Multiple Residential and Townhouses Redevelopment Sites – NJ (Project Director: 2005 – 2007)

He directed investigations, design and construction of sub-slab vapor control systems under new large commercial warehouses and residential developments.

American Airlines, LaGuardia and J.F. Kennedy Airports – NYC, NY (Project Manager: 1993 – 1996)

He managed a multi-million dollar remedial program at airport hangars and runways, negotiations with NYSDEC and PANYNJ, preparation of design and bid documents, and construction services for excavation and removal of jet fuel USTs, ASTs and soil and design and implementation of risk-based groundwater remediation of LNAPL and dissolved phase contamination including n-situ bioremediation and sparging/vacuum extraction.

Gas & Electric Utilities (Confidential Clients), Former Manufactured Gas Plant Sites (MGP) – Multiple Facilities NJ (Project Manager: 1991 – 1996)

He managed remedial investigations, air quality monitoring, feasibility studies, remedial designs, remediation and permitting to address soil and overburden/bedrock ground water dissolved and free product impacts with coal tar by-products (LNAPL and DNAPL). He performed groundwater modeling, and managed field pilot & treatability tests for biological-chemical oxidation treatment, stabilization and treatment/removal of soil, and design of pump-and-treat, capping, slurry wall containment, and passive and active free product recovery. Assignment included projection of future environmental liabilities and costs for financial planning and SEC compliance using innovative Total Cost Control approach.

Wood Treating Facilities (Confidential Clients)– NJ, CT, VA, PA, IL, (Project Manager: 1991 – 1996)

Dr. Rabah managed and implemented remedial investigations, feasibility studies, remedial designs, and remediation to address soil and overburden/bedrock groundwater dissolved and free product impacts (creosote, coal tar, pentachlorophenol, and CCA). Selected remedies included soil removal/treatment and stabilization, capping (soil and asphalt), passive and active product recovery and containment/capture (barrier walls and hydraulic control).

Bellcore, Anaerobic Biodegradation Treatability Study – Multiple Sites Nationwide (Project Manager: 1994 – 1995)

Dr. Rabah co-developed and managed an innovative anaerobic soil and groundwater-sampling and characterization program at different sites throughout the USA, for a biodegradation treatability study for waste characterization and delisting of creosote, PCP, and coal tar treated wood and subsurface bioremediation of associated impacts, in collaboration with USEPA, NJDEP, Stevens Institute of Technology, NJ Institute of Technology and Rutgers – NJ State University.

Multi NJ County Facilities, Site Assessments – Essex, Union, Monmouth, Middlesex, Somerset, Bergen, Mercer Counties in NJ (Project Director: 1998 – 2004)

He directed the development and implementation of site assessment, RI (soil, sediment, groundwater, surface water and ecological evaluations, pilot tests, hydraulic testing, and modeling), and remedial action workplans, remedial system design, preparation of technical specifications and bid documents, installation and O&MM of remedial systems. Sites included Department of Public Works (DPW), USTs and ASTS, utility garages, recreational facilities, correction facilities, parks, firing ranges, and landfills. Remedial actions included product recovery, SVE/AS, dual phase extraction, biosparging, bioventing, bioremediation, soil excavation and disposal, capping (soil and asphalt), air quality monitoring, and natural attenuation to address dissolved and free product gasoline, fuel oils, and solvent impacts.

Multi NJ Municipal Facilities, Environmental Remediation – Townships of Elizabeth, Bloomfield, Hoboken, Secaucus, Ocean, Perth Amboy, Washington in NJ (Project Director: 1998 – 2004)

He directed and managed environmental remediation and compliance programs including site assessment, RI/FS, pilot tests, hydraulic testing, and modeling, and remedial action workplans, design, installation and O&MM of remedial systems. Sites included DPW and fire facilities, UST/AST fields, utility garages, and landfills. Remedial actions included product recovery, SVE/AS, dual phase extraction, biosparging, bioventing, in-situ bioremediation, capping (soil and asphalt caps), air quality monitoring, and natural attenuation to address dissolved and free product gasoline, fuel oils, and solvent impacts.

NJ School Construction Corporation, Remediation – New Brunswick School, NJ (Project Director: 2003 – 2004)

Dr. Rabah was responsible for RI/FS, remedial system design and development of remedial cost estimates for site redevelopment. The RI was conducted pursuant to the USEPA TRIAD approach, which facilitated rapid completion of the field work and development of remedial strategies and finalizing redevelopment plans and decisions.

Franklin Lakes Board of Education, Colonial Road School – Franklin Lakes, NJ (Project Director: 2003 – 2004)

Dr. Rabah managed the remedial program at the school during site redevelopment and school construction. The program with NJSCC funding included detailed RI, the design, implementation and O&M of product recovery system, soil excavation, enhanced in-situ bioremediation, and environmental construction oversight.

NJ Department of Environmental Protection, Remedial Design Term Contract – Multiple Sites in NJ (Project Director: 2003 – 2004)

Dr. Rabah directed a multi million-dollar term-contract that encompassed preparation and implementation of remedial investigations, and development of

remedial alternative analysis, remedial designs, technical specifications, and bid documents for multi-sites throughout New Jersey. The sites included commercial and industrial facilities with soil, overburden or bedrock groundwater contamination including chlorinated solvents, metals, petroleum hydrocarbons, or PCBs.

Curtiss Wrights – Former Aerospace Manufacturing and Testing Facility – Woodridge, NJ (Project Manager: 1990 – 1993)

He led remedial investigations, modeling, pumping tests, and pump & treat remedial system design and evaluation to address overburden and bedrock groundwater dissolved and free product impacts from gasoline, fuel oil and solvent discharges from AST & UST tank farms and engine testing cells at a 200-acre site under ECRA/ISRA oversight. The project included the design, and installation of a groundwater monitoring and recovery system including 200-300 feet deep multi-port systems.

Bayonne Hospital, UST Remediation – Bayonne, NJ (Project Director: 1999 – 1996)

He managed RIs, design, construction oversight and O&MM of bioslurping and natural attenuation to remediate fuel oil, diesel, and gasoline free product, and dissolved and vapor impacts and control vapor leaks into nearby structures at hospital facilities.

Universal Aluminum, Remedial Actions of Former Paint Manufacturing Facility – Egg Harbor, NJ (Project Manager: 2002 – 2004)

He managed the design and implementation of remedial actions to address soil and groundwater impacts, which included chlorinated solvents and chromium. The selected remedial actions included soil vapor extraction and air sparging, in-situ bioremediation and natural attenuation.

IKEA, Elizabeth Park Landfill – Elizabeth, NJ (Project Director: 1999 – 2004)

He directed the remedial program at a former industrial landfill including RIs, remedial action design, and O&M of a leachate collection & treatment plant. Remedial actions included dual phase extraction to address free product and groundwater and prevent leachate migration into nearby surface water.

Hecrules, Former Industrial Landfill – Sayreville, NJ (Project Manager: 1993)

Dr. Rabah managed the remedial investigation, feasibility study, modeling and conceptual design of a containment system (capping, slurry wall and pump & treat) to control off-site leachate migration towards downgradient stream and wetlands.

Burlington County, Municipal Landfill Design and Construction Management – Burlington, NJ (Staff Engineer: 1988 – 1989)

Dr. Rabah prepared design documents and performed QA/QC inspection and construction monitoring of the landfill liner and leachate collection system.

Brownfields Redevelopment & Environmental Construction Management**Cameron Bayonne Crossing Shopping Center, Bayonne, New Jersey (Project Director: 2006-present)**

Dr. Rabah is responsible for the design and implementation of remedial program at this 30-acre site which was part of a former Refinery and other industrial facilities with soil and groundwater contamination including free floating fuel oil, tank bottom sludge and product, dissolved petroleum hydrocarbons, chromium and historic fill impacts. The remedial action includes the installation of a 3,000-foot product containment trench using impermeable barrier and product recovery system, a 3,000-foot long Biosparging/ bioventing curtain, soil excavation and disposal, soil stabilization and solidification for on-site reuse, and chemical oxidation.

Cherokee-Pennsauken, Brownfields Redevelopment Program – Camden County, NJ (Project Director: 2005 – Present)

Dr. Rabah is responsible for the planning, design, and implementation of multi-million dollar remediation project covering multiple Hess and Texaco oil storage terminals, and chemical and manufacturing sites that are contaminated with petroleum hydrocarbons, chlorinated solvents, metals including chromium, and historic fill impacts. The sites comprise a billion plus dollar mixed-use Brownfield redevelopment project in Pennsauken and Camden, New Jersey. The project includes RI/FS, the preparation of remedial action workplans, remedial designs, soil management plans, regulatory liaison, preparation of engineering cost estimates for condemnation, and construction oversight. Remedial actions include soil excavation and disposal, in-situ chemical reduction and bioremediation, capping (soil, asphalt, and low permeability clay and geosynthetic caps), and natural attenuation.

Union County Improvement Authority, Brownfields Redevelopment Project – Linden, NJ (Project Director: 2005 – 2006)

Dr. Rabah developed conceptual remedial plans and designs and prepared engineering cost estimates for two industrial sites in support of condemnation actions as part of a warehousing redevelopment project on 200-acre brownfield.

Middlesex County Vocational School Board of Education, Brownfields Redevelopment Project – Perth Amboy, NJ (Program Director: 1999 – 2004)

Dr. Rabah directed multi-million dollar Site redevelopment, remediation engineering and environmental construction oversight services at this Brownfield

site, which was the location of former DuPont, Velasco and General Cable industrial facilities. He coordinated and managed state, county and municipal remedial funding, public outreach program, regulatory interface, preparation of technical specifications and bid documents, and construction management. The project included the design, implementation and OM&M of multi-phase, RI/FS, air quality monitoring, a comprehensive SVE/AS remediation and monitoring system with remote access/control, in-situ bioremediation, natural attenuation and capping (soil and asphalt) for chlorinated solvents, petroleum hydrocarbon and metals impacts. The redevelopment program included building decommissioning, asbestos and lead abatement, mass excavation, processing, and backfilling or disposal of over 50,000 CY of soil and construction of subslab vapor depressurization system.

Secaucus Township, Former Keystone Metal Finishers Site Remediation & Redevelopment Project – Secaucus, NJ (Project Director: 2000 – 2003)

Dr. Rabah served as a project director for the remediation and redevelopment of the site as a Community Park and residential homes. He coordinated and managed state and municipal remedial funding, financial planning, and public outreach program, regulatory negotiations, and design and implementation of remedial actions. The remedial program included in-situ anaerobic bioremediation of an extensive ground water PCE/TCE plume that extended under nearby residences in overburden and bedrock aquifers, air and water quality monitoring at nearby residences and baseline risk assessment.

Toresco, Strauss Auto, Remediation Services – North Plainfield, NJ (Project Director: 2000 – 2002)

He directed the remediation program of the former Brownfield Site for development as an auto dealership. The program included design, installation and O&MM of SVE/AS and in-situ bioremediation systems during the site redevelopment and construction.

NJ School Construction Corporation (SCC), Anastasia School Remediation & Redevelopment – Long Branch, NJ (Project Director: 2003 – 2004)

He directed the remediation of the former industrial site for redevelopment into a school. The program included RI/FS, remedial design, permitting, site remediation to address subsurface impacts associated with prior site activities, environmental construction oversight of construction dewatering and groundwater treatment and discharge as well as health and safety training, and remediation oversight. Remedial actions included soil excavation and off-site disposal, capping (soil, asphalt, and concrete), and natural attenuation.

Camden Redevelopment Authority, Harrison Avenue Landfill, Brownfield Redevelopment Program – Camden, NJ (Project Director: 2005 – Present)

Dr Rabah serves as a Project Director for the 80-acre landfill closure and redevelopment as a golf course and community service center. The project encompasses RI/FS and the preparation of remedial action workplans and closure designs and construction oversight of landfill closure, leachate and gas management systems, subslab depressurization system, chemical oxidation, and capping (soil and geosynthetic).

Port Street Redevelopment Corp., T&J Landfill Closure & Redevelopment, Newark, NJ (Project Director: 2005 – Present)

He is responsible for the remediation, closure and redevelopment of the former 10-acre landfill into a parking lot. The project includes RI/FS and preparation of remedial action workplans and closure designs and construction oversight of landfill closure, leachate and gas management systems, capping, and stormwater management system.

Bergen County Improvement Authority, Overpeck County Park Landfill Closure – Bergen County, NJ (Project Director: 2003 – 2004)

Dr. Rabah served as a Project Director for the 100-acre landfill closure and Park redevelopment project into a community and recreational park. The project encompassed RI/FS, the preparation of design specifications and bid package and construction oversight of the landfill remedial / closure plans, landfill leachate and gas collection and discharge systems, and capping.

Home Depot, Warehouses – NJ and NY (Project Director: 1999 – 2004)

Dr. Rabah directed the development and implementation of remedial investigation, remedial action workplan, remedial alternative analysis, and remedial design, and the remedial actions, environmental construction management and regulatory negotiations to remediate former industrial complexes and sites for redevelopment.

Water Resources Planning & Engineering

US Agency for International Development (USAID), Palestine Municipal Services Project/ Water Resources Program-Phase I (Planning Task Manager: 1996 – 1997)

He managed the development of Water Resources Master Plan, Water Resources Management and Facility Master Plans for several Governorates in the West Bank.

World Bank, Water Sector Strategic Plan for Palestine (Co-Project Manager: 1997)

Dr. Rabah evaluated various water development and management alternatives and identified and prioritized water sector development projects and packages.

USAID, Feasibility Study of Rainwater Harvesting for Recharge in the Eastern Aquifer Basin in the West Bank (Co-Project Manager: 1998)

Dr. Rabah performed hydrogeologic and engineering evaluation for alternative rainwater harvesting scenarios including aquifer recharge and surface water reservoirs.

NJ Water Supply Authority, Hydrologic Modeling – Cranberry Lake Dam, NJ (Project Engineer: 1990)

Dr. Rabah conducted watershed analysis and hydrologic and hydraulic modeling to evaluate the impact of the earthen dam breach on floodplain areas for spillway rehabilitation and redesign. It included the assessment of runoff, streamflow, and flood routing for rainfall events with computer models TR-55, HEC-1, HEC-2, and DAMBREAK.

NJ Water Supply Authority, Manasquan Dam – Monmouth, NJ (Staff Engineer: 1989)

Dr. Rabah conducted QA/QC monitoring of the construction of earthen embankment, dikes, impervious core/slurry wall, drainage system/filter, spillway riprap barrier, and wetlands for a 100-foot high earth-fill dam of the Manasquan Reservoir and tributaries.

PA Power & Light Electric Station, Hydrologic and Hydrogeologic Studies – Susquehanna, PA (Project Manager: 1994)

Dr. Rabah led hydrologic and hydrogeologic studies, bedrock well installation, pumping tests and groundwater modeling to develop additional water supply for the power plant.

Essex County Utility Authority, Remedial Investigations – Verona, NJ (Project Manager: 1999 – 2002)

Dr. Rabah directed water resource investigations, designs, rehabilitation and operation & maintenance of water system. The project also included aquifer characterization and pumping tests at deep bedrock wells and groundwater modeling to assess the capture zone and regional hydraulic response for a regional basin and water supply development as well as environmental impact assessment for wellhead protection program.

UNDP/FINNIDA, Wastewater Planning – Hebron & Ramallah, West Bank (Co-Project Manager: 1996 – 1999)

Dr. Rabah co-managed and was instrumental in the development of Wastewater Master & Management Plans for the Hebron and Ramallah governorates.

Joint Meeting of Essex and Union Counties – Elizabeth, NJ (Project Manager: 2003)

He was responsible for the development and implementation of Ammonia Toxicity Study Workplan pursuant to NJPDES Permit for the Wastewater Treatment Plant to develop effluent ammonia discharge criteria to the Arthur Kills from the WWTP and included field sampling and measurement, laboratory analyses and modeling.

Edgewater Municipal Utility Authority – Edgewater, NJ (Project Director: 2003)

He was responsible for a Dilution Study workplan pursuant to the NJPDES permit to redesign the effluent outfall of the Edgewater WWTP to Hudson River.

Woodbridge-Carteret-Rahway WWTP – Carteret and Rahway, NJ (Project Engineer: 1989 – 1990)

Dr. Rabah conducted inspection of the construction of main and secondary wastewater pumping stations, collection piping network, and foundations.

Housing & Commercial Developers – NJ, NY and MD (Project Engineer: 1989 –1996)

Dr. Rabah managed subsurface investigations, modeling, treatment alternative evaluation to assess the performance and design of subsurface wastewater discharge fields.

Litigation Support/Technical Expert Review

Warren Co. Municipal/Solid Waste Landfill – Warren County, NJ (1993 – 94)

Dr. Rabah conducted hydrogeologic evaluation, liability assessment and cost recovery/allocation regarding landfill liner construction failure.

ELCO, Metal Plating Facility – Connecticut (1993)

Dr. Rabah was responsible for source identification and support of remedial cost recovery related to subsurface impacts with petroleum hydrocarbons and metals.

Buxton Dairy Ice Cream, Groundwater Assessment – Somerset County, NJ (1999 – 2000)

Dr. Rabah was responsible for assessment of groundwater impacts, sources and cost allocation in relation to the Rocky Hill Municipal Wellfield and Montgomery Township Housing Development Superfund Sites in Somerset County, NJ.

Municipal DPW, Washington Township – Bergen County, NJ. (2002)

Dr. Rabah served as an expert and conducted contaminant fate and transport investigations and modeling for source identification and assessment of groundwater impacts including nearby production wells from on-site and off-site gasoline USTs.

Brinckerhoff et al. Co., Groundwater Assessment Expertise – Fishkill, Dutchess County, NY (2001 – 2002)

Dr. Rabah served as an expert for assessment of groundwater remediation, plume age dating and cost recovery due to a gasoline and fuel oil spill from service station.

NJ Turnpike Authority, Service Area 13 – Ridgefield, NJ (2002-2003)

Dr. Rabah served as an expert and managed hydrogeologic and environmental investigations and groundwater modeling for source identification, plume age-dating and cost allocation for groundwater plumes from gasoline and diesel UST farm, dispenser systems and vapor recovery system.

Union County Venneri Complex, Groundwater Modeling – Westfield, NJ (2001 –2003)

Groundwater flow and transport modeling and forensic analysis for source identification, plume age-dating, stormwater piping system impacts related to groundwater dissolved and LNAPL impacts from gasoline and diesel USTs & piping.

ACADEMIC EXPERIENCE

- Rutgers University – Continuing Education Program, New Brunswick, NJ
 - Instructor (2006 and 2007) – Soil & Groundwater Remediation Course
- Birzeit University, Civil Engineering Department, Ramallah, WB:
 - Assistant professor (1996) – Geotechnical Eng. and Building Materials
- Stevens Institute of Technology, Civil & Environ. Eng. Dept, Hoboken, NJ
 - Adjunct Professor (1993) – Groundwater Engineering
 - Instructor/TA (1982-88) -Groundwater & Geotechnical Engineering

PROFESSIONAL AFFILIATION

- Project Management Institute
- American Society of Civil Engineers
- Association of Groundwater Scientists and Engineers

PUBLICATIONS

Lekmine D.E. and N. Rabah. Enhanced in Situ Remediation at a Brownfield Site. Brownfield Conference, Cadiz- Spain, September 2002.

Rabah, N. and D. Lekmine. Enhanced in Situ Bioremediation of Chlorinated Solvents. The 6th Int. Symposium: In Situ and On-Site Bioremediation (Battelle) San Diego, CA, 2001.

Talimcioglu, M., N. Rabah, and D. Lekmine. Remedial Cost Allocation Analysis for Commingling MTBE Plumes. National Groundwater Association: Focus

Conference - MTBE in Groundwater: Assessment, Remediation tech., and Public Policy; Baltimore, MD, 2001.

Kayal, R.R. and N.M. Rabah. Groundwater Modeling: An Effective Tool for Evaluating Natural Restoration of Aquifers. Proc. International Conference on Computational Methods and Water Resources, Lebanon, 1995.

Rabah, N. and A. Tarabichi. Interdisciplinary Aspects of Geometrical Modeling of Deformations. Proc. International FIG Symposium: Deformation Analysis and Engineering Surveying and ISPRS Working Group V/3: Photogrammetry in Eng. Surveying. H. Rüther / H. van Gysen (Eds)]. Int. Federation of Surveyors, Cape Town, February 1995.

Rabah, N., N. Pal, C. Okoye, and G. Korfiatis. A Novel Protocol for Sampling of Soil and GW for Anaerobic Biodegradability Studies. Geoenvironment 2000. ASCE conference, LA, 1995.

Rabah, N., G. Korfiatis and A. Demetracopoulos. A Numerical Model of 2-D Transient Transport of Reactive Solutes in Variably Saturated Soils, Proc, Int. Conf. on Interaction of Computation. Methods and Measurements in Hydraulics and Hydrology, Hungary, May, 1992.

Rabah, N.M. "Mathematical and Experimental Study of Two-Dimensional Transport in Partially Saturated Soils," Ph.D. Dissertation, Stevens Inst. of Tech, N J, 1989.

Korfiatis, G.P. and N. Rabah. "A Model for Prediction of Mound under Septic Fields" Proc. Int. Conf. on Development & Applications of Computer Techniques to Env. Studies, Greece, 1988.

Korfiatis, G.P., N.M. Rabah, and D. Lekmine. "Permeability of Compacted Clay Liners in Laboratory Scale Models, ASCE-Specialty Conference, Geotechnical Practice and Waste Disposal, MI, 1987.

Korfiatis, G.P. and N.M. Rabah. "Problems Associated with Verification of Unsaturated Flow and Mass Transport Numerical Models", Proc. International Conference on the Reliability and Robustness of Engineering Software, Italy, September 1987.

HOWARD F. NICHOLS, P.E.

EDUCATION

M.E., Environmental Engineering, Stevens Institute of Technology, 2010

B.E., Environmental Engineering, Stevens Institute of Technology, 2000

PROFESSIONAL REGISTRATIONS/CERTIFICATIONS

Professional Engineer, New Jersey, (#24GE04683300), 2007

AREAS OF EXPERTISE

Mr. Nichols has over nine years of experience encompassing:

- Environmental Remediation and Remedial System Operation & Maintenance
- Remedial Alternative Analysis
- Remedial Investigations
- Environmental Construction Management & Quality Control

REPRESENTATIVE EXPERIENCE

Mr. Nichols is Project Manager with TRC's Millburn office. Mr. Nichols is involved in the development and implementation of remedial designs and actions. Mr. Nichols is responsible for preparing Remedial Action Work Plans and Remedial Action Selections Reports.

Environmental Remediation & Remedial System Operation & Maintenance

Center Ave Holding, former industrial facility, Little Falls, New Jersey (Project Remedial Engineer: 2007-present)

Mr. Nichols designed and implemented the soil and ground water remediation at the former industrial facility to address the soil and ground water solvents impacts (PCE, TCE, chlorobenzene, and petroleum hydrocarbons) within a multi-unit aquifer system. The soil remedial action included soil/source excavation and off-site disposal. The ground water remedial action included enhanced in-situ bioremediation using emulsified vegetable oils using innovative Primawave™ process. The technology, which incorporates patented tooling (called "Hornet"), generates a fluid pulse that momentarily and elastically dilates the pore throats of porous media to enhance the ability to distribute injection fluids uniformly into the aquifer and increase the injection radius of influence. A full-scale injection program was completed and resulted in nearly complete reduction of the chlorinated and petroleum hydrocarbon impacts. The injection program was conducted in multiple depths to target different zones in this difficult geology.

Ridgemont Shopping Center, Dry Cleaning Facility, Bergen County, NJ (Project Remedial Engineer: 2007-present)

Mr. Nichols designed the remedial system to address soil and ground water impacts with residual NAPL and chlorinated solvents in a multi-unit deep aquifer system. The remedial system included soil vapor extraction/air sparging (SVE/AS) and innovative in-well air

stripping with in-well ground water recirculation and SVE/AS both under and outside the main building. In addition, the remedial program included indoor vapor intrusion investigation and the design and installation of sub-slab depressurization system.

CPB, former manufacturing facility, Far Rockaway, New York (Project Manager: 2008 – present):

Mr. Nichols serves as the project manager for the remedial investigation and design and implementation of the remedial action at the former industrial site. The project included ground water delineation and characterization in a multi-unit coastal aquifer system that was impacted with residual NAPL and chlorinated solvents (PCE and TCE). Mr. Nichols designed and implemented a field pilot scale test of in-situ chemical oxidation using activated Percarbonate.

MCIA, Princeton Meadows Golf Course - Plainsboro, NJ (Project Engineer: 2002 - 2003)

Mr. Nichols conducted and evaluated a pilot test for Soil Vapor Extraction and Air Sparging System, in conjunction with a Bioslurping System to address free product, soil and groundwater contamination resulting from leaking underground storage tanks. The evaluation data was used to generate the Remedial Action Work Plan with a detailed design of the system to be installed at the site.

AIG, Woodbrook Road Superfund Site – South Plainfield, NJ (Project Engineer: 2007)

Mr. Nichols composed the required technology identification and screening memorandum for remedial actions to address PCB impacted soils and debris at the superfund site. Additionally, Mr. Nichols took part in the remedial and closure investigation for the historic landfill. Mr. Nichols is also leading the ongoing feasibility study to identify potentially innovative and cost saving remedial options for the site, including alternative capping technologies, on-site treatment techniques and waste consolidation alternatives. Mr. Nichols is responsible for the design of the remedial action including waste excavation and off-site disposal, consolidation and capping.

City of Secaucus, Keystone Metal Finishers - Secaucus, NJ (Field Engineer: 2000 - 2001).

Mr. Nichols participated in the implementation of in-situ anaerobic bioremediation of chlorinated solvents at the former metals finishing site. The project involved the injection of Hydrogen Release Compound (HRC) through temporary injection points to address dissolved chlorinated solvents contamination. A detailed groundwater, indoor air and sump water sampling program was incorporated with the remediation project.

City of Elizabeth, Water Utility Garage - Elizabeth, NJ (Project Engineer: 2000- 2003)

Mr. Nichols oversaw the operation and maintenance of the Soil Vapor Extraction and Bioslurping remediation system located at the former Water Utility Garage. The remediation system removed Non-Aqueous gasoline from source area wells via bioslurping, and

incorporated several SVE wells. A thermal oxidizing unit, with propane as a supplemental fuel, was used for vapor treatment.

City of Boonton, Department of Public Works, Boonton, New Jersey (Project Engineer: 2001 -2003)

Mr. Nichols oversaw the operation and maintenance of the Soil Vapor Extraction and air sparging remediation system located at the DPW. The remediation system removed Non-Aqueous gasoline from source area wells via several SVE/As wells and trenches.

Remedial Investigations

Clinton Milk Company, Clinton Milk Distributors - Newark, NJ (Project Engineer: 2001-2003)

Mr. Nichols conducted a detailed site investigation to delineate gasoline impacts to the sub-surface, at the active dairy distribution facility. The media of concern for this project included soil, groundwater in the unconsolidated aquifer and groundwater in the bedrock aquifer. The site investigation involved the advancement of soil borings using air rotary and direct push technologies, installation of shallow monitoring wells and the installation of bedrock monitoring wells. All work at the site was done in coordination with the distribution facility management to avoid any impact to the facility operations.

NJ School Construction Corporation, New Brunswick High School - New Brunswick, NJ (Task Manager: 2003)

Mr. Nichols participated in a site investigation at the location of a proposed New Brunswick high school. The investigation was coordinated with the NJDEP and the property owner using the Triad Approach for rapid site characterization. Mr. Nichols conducted a thorough investigation of the groundwater on site in both the overburden and bedrock aquifers. Packers were used to collect discreet samples, and to determine the location fracture zones. The investigation program employed an onsite laboratory to quickly determine area where further delineation was necessary.

Cities of Teaneck and Leonia, Overpeck Landfill - Teaneck/Leonia, NJ (Project Engineer: 2002 - 2003)

Mr. Nichols participated in the remedial/closure investigation of the municipal landfill. Mr. Nichols oversaw the investigation crews advancing soil borings, installing monitoring wells and excavating test pits. The investigation also identified areas with insufficient surface cover and characterized the waste disposed in the landfill. Mr. Nichols also participated in the design of the final cap, including the creation of a detailed hydraulic model, and the design of the leachate collection system.

Remedial Alternative Analysis

AIG, Woodbrook Road Superfund Site – South Plainfields, NJ (Project Engineer: 2007)

Mr. Nichols composed the required technology identification and screening memorandum for remedial actions to address PCB impacted soils and debris at the superfund site. Additionally, Mr. Nichols took part in the remedial and closure investigation for the historic landfill. Mr. Nichols is also leading the ongoing feasibility study to identify potentially

innovative and cost saving remedial options for the site, including alternative capping technologies, on-site treatment techniques and waste consolidation alternatives.

Petrochemical Plant & Refinery (Confidential Client) – Union County, NJ (Project Manager: 2006)

Mr. Nichols was responsible for the development and preparation of Remedial Action Workplans and Remedial Action Selection Reports for seven on site landfills. The reports involved the review of all relevant and historic site information pertaining to past operations, disposal practices and impacted media. The information was used to screen potential remedial alternatives and select an ultimate course of action. Subsequent to the remedial action determination, planning level estimates were developed to determine capital and future OM&M costs.

Petrochemical Plant & Refinery (Confidential Client) – Middlesex County, NJ (Project Engineer: 2006)

Mr. Nichols assisted in the analysis of remedial alternatives for two chemical and petrochemical installations scheduled for closure. The remedial alternative analysis included an in-depth development and review of remedial costs, as well as separate operating and implementation scenarios. Remedial actions were selected for different plant operating scenarios; with present value summaries to assist the client minimize cleanup and closure costs.

Environmental Construction Management & Quality Control

US Army Corps of Engineers, SWMU 23 and 13 Remediation, Kansas Army Ammunition Plant - Parsons, KS (Quality Control Manager: 2005)

This project involved the remediation of metal and explosive compounds in soil located in the immediate area of former burn cages, as well as the relocation of a construction and demolition debris landfill. The quality control aspects of the project involved conducting and maintaining analytical and field sampling data to ensure that the extents of contamination were excavated, and ensuring that the engineered landfill constructed to house C&D debris was created and filled to project specifications. This project received an outstanding CCASS rating from the US Army Corps of Engineers.

SPECIALIZED TRAINING

OSHA 40-Hour Health and Safety Training, 1999

OSHA 10-Hour Construction Safety Training, 2001

Construction Quality Management for Contractors – Us Army Corps Of Engineers, 2004

Loss Prevention System Training for ExxonMobil Facilities, April 2006.

BHUVNESH J. PAREKH

EDUCATION

M.S. Bioresources Engineering, Rutgers State University, 2005

M.S. Environmental Science, Rutgers State University, 2002

M.S. Environmental Pollution Control Technology, Bombay University, 1999

B.S. Chemistry, Bombay University, 1997

AREAS OF EXPERTISE

- Remedial Investigation
- Remedial System Planning, Design and Engineering
- Environmental Construction and Quality Management Control

REPRESENTATIVE EXPERIENCE

Mr. Parekh is an Associate Project Manager with TRC's Millburn office. Mr. Parekh is involved in the development and implementation of remedial designs and actions. Mr. Parekh is responsible for preparing Remedial Action Work Plans and Remedial Action Selection Reports.

Remedial Investigation, Implementation, and Environmental Construction Oversight

Camden Redevelopment Agency – Harrison Avenue Landfill, Camden, NJ (Associate Project Engineer: 2009)

Mr. Parekh was responsible for putting the Remedial Action Work Plan for Harrison Avenue Landfill. The Remedial Action Work Plan was for the entire landfill involved in identifying the remedial actions for the hotspots, stabilization of banks, and management of leachate. Also assisted in computing fate and transport for the ground water contamination moving off-site and establishing the boundaries and the life of contamination.

Camden Redevelopment Agency – The New Salvation Army Camden Site, Harrison Avenue Landfill, Camden, NJ (Associate Project Engineer: 2009)

Mr. Parekh was responsible for designing the closure of a portion of the entire Harrison Avenue Landfill, Camden, NJ. This portion of the landfill is eventually going to develop into a community center. The design included landfill gas management system, capping, management of leachate and management of surface run-off.

Exxon Mobil – Bayway Refinery, Linden, NJ (Deputy Project Engineer: 2009)

Mr. Parekh is responsible to assist project manager in reviewing Remedial Design Reports to implement various Remedial Actions to be implemented at the Site. Oversee the construction schedule.

City of Secaucus, Keystone Metal Finishers – Secaucus, NJ (Project Engineer: 2009)

Mr. Parekh assisted the City to verify the extent of ground water and soil contamination. This task was accomplished by collecting soil and ground water samples.

Bergen County, Overpeck Area Phase III – Ridgely Park, NJ (Project Engineer: 2004 - 2009)

Mr. Parekh was responsible for the Site Investigation, Closure and Post Closure, Design of Leachate Collection System, preparation of construction schedule. Mr. Parekh was also responsible to manage the construction activities. The project included slope stability analysis, placing cap material at the site based upon the final elevation, design leachate collection system and discharging to public sewer, seeking all necessary permits and soil management. Soil Management Activities included collecting soil samples for characterization and qualification for off-site transport; tracking soil quantities transported off-site through use of Bill of Lading tickets

Gloucester County, Glassboro Landfill – Glassboro, NJ (Project Engineer: 2004 - 2006)

Mr. Parekh was responsible to prepare the entire site investigation plan. Delineate the landfill from the neighboring fields. Design a site remediation plan for the neighboring fields that were affected by the landfill. Design gas control system to prevent the mitigation of landfill gas into neighboring farms.

Encap Holdings, Encap Landfill – Lyndhurst, NJ (Project Engineer: 2004 - 2006)

Mr. Parekh oversaw the Soil Management Activities for capping the site, which included collecting soil samples for characterization and qualification for off-site transport; tracking soil quantities transported off-site through use of Bill of Lading tickets.

ACADEMIC EXPERIENCE**May' 00-March'02 Department of Environmental Sciences, Rutgers University: Research Assistant**

Simulated the generation of methane gas in an anaerobic digester by digesting the municipal solid waste and controlling the recycle amount of the leachate. Temperature and moisture were the main controlling factors for the gestation period of the anaerobic microbes. Methane gas was quantified by using G.C. MS.

Feb'01- March'02 Department of Environmental Sciences, Rutgers University: Research Assistant

Composting of municipal solid waste, recovered from a ten-year-old landfill. Windrows were set-up for composting municipal solid waste (Windrow dimensions: 10ft long- 5ft height-7ft wide). The windrow was divided into three different sections based on the age of the municipal solid waste. The composting pile was kept for 180 days. Composting pile was regularly checked for the following parameters, C:N ratio (carbon content was

determined by volatile content method and for N, the Kjeldahl procedure, moisture and temperature.

SPECIALIZED TRAINING

- 40-Hr OSHA HazWoper Training, 2003
- Annual OSHA 8-hour HAZWOPER Refresher Course, 2009

ARTHUR GOELLER, CPG

EDUCATION

M.S., (Geology) Rutgers University, 1989
B.S., (Geology) Richard Stockton College, 1985

PROFESSIONAL REGISTRATIONS/CERTIFICATIONS

Certified Professional Geologist - American Institute of Professional Geologists (#CPG-08849)
Registered Professional Geologist, Tennessee (#TN1310)
NJDEP Subsurface Evaluator Certification, New Jersey (#0010921)

AREAS OF EXPERTISE

Mr. Arthur Goeller, CPG has over 20 years of experience encompassing:

- Hydrogeological Investigations
- Geologic and Geophysical Site Characterization
- Groundwater Contamination Investigation and Management (LNAPL /DNAPL/Metals)
- Evaluation of Remedial Alternatives
- Remediation System Design and Operation
- Development and Implementation of Remedial and Regulatory Closure Strategies
- Litigation Support
- Environmental Insurance Technical Review
- Underground Storage Tank Closure and Subsurface Evaluation
- Management and Implementation of Phase II Environmental Site Assessments
- Project and Program Management

REPRESENTATIVE EXPERIENCE

Mr. Goeller has participated in and conducted over twenty remedial investigations (CERCLA, State-level) and sixty-five underground storage tank (UST) investigations. He has installed and/or managed over twenty groundwater and soil remediation systems. His practical experience in remediation systems includes: free-product (LNAPL) skimming, large diameter recovery wells, multiple well networks, interceptor trenches, soil vapor extraction, vacuum-enhanced groundwater extraction, air sparging and enhanced bioremediation. He has also developed remedial programs to demonstrate the occurrence of natural attenuation.

Groundwater Geology

Tirpok Cleaners, Remedial Investigation – Flemington, NJ (Project Manager and Project Hydrogeologist: 2005 – 2006)

Mr. Goeller served as Project Manager and Project Hydrogeologist for this dry cleaning facility. Tirpok has entered into an administrative consent order (ACO) with the NJDEP. The NJDEP previously identified chlorinated hydrocarbon constituents in off-site and on-site production wells (screening bedrock aquifers). The NJDEP conducted a site investigation of the property and concluded that potential source(s) of the contamination were present at the site. Mr. Goeller developed the technical scope and remedial investigation workplan (including quality assurance project plan and HASP) to comply with the ACO. Proposed remedial investigation activities included implementing a soil gas survey, soil and sediment sampling of suspected on-sources sources, shallow and deep bedrock drilling, geophysical logging and packer testing of the on-site production well and off-site bedrock boreholes, monitoring well cluster installation and sampling to assess the contaminant distribution and groundwater flow regimes.

Lucent Technologies, Inc., Remedial Investigation – Chester, NJ (Project Manager and Project Hydrogeologist: 2001 – 2005)

Mr. Goeller served as Project Hydrogeologist and Project Manager for ISRA project. Groundwater constituents (primarily TCE; minor MTBE, toluene, benzene) were identified in off-site potable wells and on-site production wells (screening bedrock aquifers). The potential source(s) of the contamination had not been previously identified. Site activities included soil and sediment sampling of suspected on-sources sources, geophysical logging of five production wells, conversion of production wells into monitoring wells, and bedrock well cluster installation and sampling to assess the contaminant distribution and groundwater flow regimes. To gain a better understanding of the bedrock framework, structural geology mapping was conducted to identify the dominant orientation of joint sets. Downhole geophysical logging (including optical televiewer) of open bedrock boreholes was also completed to identify specific water bearing fracture systems for well construction. To facilitate and expedite the vertical delineation of groundwater constituents within the bedrock aquifer system, passive diffusion bags (PDBs) installed and sampled in open boreholes prior to well construction. Ultimately, a technical argument was developed to support No Further Action for groundwater based on the following: a) Absence of Onsite Sources in the Soil or Shallow Groundwater at the Site; b) Hydrogeologic Evidence showing that Groundwater was Flowing toward the Site, making site hydraulically downgradient from the regional TCE contamination; and c) Evidence of several possible off-site sources of chlorinated VOC contamination. These RI activities succeeded in achieving AOC closure for most locations, significantly reducing the number of outstanding regulatory issues and enabling the client to ultimately sell the property.

Gabrellian Associates, Remedial Investigation – Park Ridge, NJ (Project Manager: 2005 – 2006)

Mr. Goeller served as Project Manager for the investigation of chlorinated hydrocarbon contamination at a dry cleaner facility in a shopping center. Chlorinated hydrocarbon constituents were identified in off-site potable wells (screening bedrock aquifers). The site was identified as a suspected potential source of the contamination by the NJDEP. Based on the results of historical remedial investigation work, Mr. Goeller developed the technical work scope and remedial investigation work plan to address past NJDEP comments and comply with the Technical Requirements of Site Remediation. Following NJDEP approval of the RI work plan, Mr. Goeller coordinated and managed a passive soil gas survey, delineation soil sampling of suspected on-site sources, temporary well installation and sampling around soil impacts, bedrock drilling for vertical delineation of ground water impacts, geophysical logging of the new bedrock borehole and existing bedrock wells, sampling of ground water using HydraSleeves to assess the vertical contaminant distribution. The downhole geophysical logging (including optical televiwer) of the open bedrock borehole will identify specific water bearing fracture systems for well construction. The results of these activities will be ultimately presented in a remedial investigation report. Future activities to be implemented include air discharge permitting, installation of remedial points, and the implementation of a soil vapor extraction (SVE) and air sparging pilot test to address shallow soil and ground water impacts.

Stearns and Foster Bedding Company, DNAPL Contamination Investigation – South Brunswick, NJ (Resident Project Manager and Project Hydrogeologist: 1993 – 1999)

Mr. Goeller served as Resident Project Manager and Project Hydrogeologist for a chlorinated hydrocarbon investigation of bedrock aquifer beneath a former manufacturing facility in New Jersey. The project included: shallow and deep bedrock monitoring well installation; geophysical logging, packer testing, and delineation of an identified soil hot spot using Geoprobe technology; stream/sediment and groundwater sampling; installation of a blasted bedrock trench and a groundwater treatment system for hydraulic containment of the contaminant plume; and report preparation.

Woolley Fuel Company, Remedial Investigation – Maplewood, NJ (Project Manager: 2005 – 2006)

Mr. Goeller served as Project Manager for the investigation of petroleum hydrocarbon contamination at a fuel oil distribution facility. Petroleum hydrocarbon constituents have been identified in on and off-site wells the screen the overburden and bedrock aquifers. Based on the results of historical remedial investigation work, Mr. Goeller developed the technical work scope and remedial investigation work plan to address past NJDEP comments and comply with the Technical Requirements of Site Remediation. During the implementation of the RI work plan, Mr. Goeller has coordinated and managed an investigation of off-site sources, delineation soil sampling of on-source areas, and off-site temporary well

installation and sampling. Future activities to be implemented include bedrock drilling for vertical and areal delineation of ground water impacts, geophysical logging of the bedrock boreholes, and sampling of ground water using HydraSleeves to assess the vertical contaminant distribution. The results of these activities will be ultimately presented in a remedial investigation report.

Shell Oil Company, Hydrocarbon Contamination Investigation – Cross River, NY (Project Hydrogeologist: 1991)

Mr. Goeller served as a Project Hydrogeologist for a petroleum hydrocarbon investigation at a service station site in New York. This project required a remedial investigation and remedial action to address an impacted bedrock aquifer used for potable water supply. Gasoline compounds were detected in three municipal wells (used by a condominium complex) located immediately downgradient of the site. The remedial design included the temporary connection of two large diameter granular activated carbon units to the existing water treatment system. The service station potable well (screened in bedrock) was identified as a possible source and was investigated with a down-hole camera and packer testing. Structural geology mapping was conducted on local outcrop to identify the dominant orientation of shallow bedrock fracture sets. Well installation and hydraulic gauging activities were conducted to evaluate the shallow groundwater flow regime in the bedrock. Based on the findings of the investigation, it was determined that another local service station was responsible for the municipal well contamination.

Remedial Investigation/Evaluation of Remediation Alternatives

General Services Administration – MidAtlantic Region, Remedial Investigation Implementation/Remedial Action Plan Development – Hillsborough (Belle Mead), NJ (Project Manager: 2001 – 2005)

Mr. Goeller acted as Project Manager for a Remedial Investigation and Evaluation of Remedial Alternatives for the former Belle Mead Army Depot (745 acres) in Belle Mead, New Jersey. Over twenty areas of concern have been identified at the site including: former landfills, a burn pit and salvage yard, former USTs and ASTs, a motor pool, strategic minerals stockpiles, a rail yard, an inactive wastewater treatment plant and former warehouses. Previously identified contaminants of concern in soils and sediments include: priority pollutant metals, polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs) and pesticides. In addition, chlorinated and non-chlorinated VOCs have been identified in groundwater (in fractured bedrock) in the vicinity of a former motor pool building. Work being performed at the site complies with the regulations established by the New Jersey Department of Environmental Protection (NJDEP), the lead regulatory agency responsible for this project.

The primary goal of this project is to conduct appropriate work in accordance with the requirements of the NJDEP, pursuant to an existing Memorandum of

Understanding between the GSA and NJDEP, to allow the GSA to dispose of the site. In accordance with a Memorandum of Understanding, the following work was conducted: 1) Reviewed historical information and conducted site reconnaissance to complete and submit draft and final Remedial Investigation (RI) Workplan to NJDEP, 2) Implemented the RIW, including soil and groundwater investigation, 3) Provide Community Relations support 4) Conducted a Baseline Ecological Evaluation (BEE), 5) Prepared and submitted an RI Report to NJDEP summarizing findings of RI, 6) Conducted additional sampling as required based on the results of the RI and BEE, 7) Prepared and submit reports of additional investigations as required, 8) Conducted a Remedial Alternative Analysis (RAA) and prepare a preliminary Remedial Action Selection Report based on all available data, 9) Prepared a Potable Well Sampling Plan and conducted offsite well sampling of neighboring properties, and 10) Prepared a Supplemental RI Workplan for conducting additional investigation activities to conclude the RI. The results of the investigations conducted to date have identified metals and semi-volatile organic compounds in soils that may be addressed through the engineering and institutional controls on the site. Groundwater impacts (VOCs, metals) has also been identified in some areas of the site that may require active remediation.

Citicorp Real Estate, Site Investigation/Remedial Alternatives Analysis – Stony Point, NY (Project Manager and Senior Hydrogeologist: 1996)

Mr. Goeller acted as Project Manager and Senior Hydrogeologist for a project involving Site Investigation, Remedial Alternatives Analysis and Preliminary Remedial Design. The site is a boat marina with underground storage tank impacts located on the Hudson River in Stony Point, New York. Site investigation activities included test pits, installation of monitoring wells, collection of soil and groundwater samples and a tidal survey. Based on the site investigation results, multiple remedial options were evaluated and remedial cost estimates developed. These results and evaluation were ultimately summarized in a report and subsequently discussed with the NYSDEC onsite.

Emergency Hazardous Material Spill Response

Napp Technologies, Emergency Response – Lodi, NJ (Project Hydrogeologist: 1995)

Mr. Goeller served as a Project Hydrogeologist on this emergency response project. Following a major chemical explosion at a small chemical facility, Mr. Goeller responded to the site to immediately interface with the regulatory agencies (USEPA, NJDEP, Township Health Department) and assess the site damage. Surface runoff from the explosion site had entered the adjacent Saddle River. Mr. Goeller developed the scope of a sampling program and immediately conducted sampling of stream water and sediment, biota and flat surfaces (roofs, sidewalks, building interiors, catch basins) for chemical analysis to assess the impact of the explosion.

Environmental Insurance Technical Reviews

AIG Environmental, Environmental Insurance – Various US Locations (Senior Consultant/Dedicated Environmental Engineer: 1999 – 2001)

Mr. Goeller served as Senior Consultant/Dedicated Environmental Engineer in New York City, New York. This inhouse position directly supported AIG Environmental underwriters crafting environmental insurance policies (Pollution Legal Liability, Cleanup Cost Cap) for single site and large portfolios. Work activities included the evaluation of site and file documents (Phase I, II, III, Remedial Action Plans) on domestic properties, implementing site inspections and field surveys, conducting telephone surveys with facility manager, environmental consultants, and regulatory officials, interpretation of hydrogeologic and chemical data, identification of data gaps, evaluation of remedial program strategy and design, evaluation of remedial cost estimates, performing probability statistical modeling on remedial cost information, developing risk profiles, establishing policy attachment points (coverage triggers), managing vendors (environmental consultants), contract/budget management, client/broker interfacing, business development/marketing, and report preparation.

Evaluation of Remediation Alternatives/Remedial Design Implementation

Cosan Chemical Corporation, ISRA RI/RA – Carlstadt, NJ (Project Hydrogeologist: 1996-1999, Project Manager: 2001 – 2005)

Mr. Goeller served as Project Hydrogeologist and Project Manager for an ISRA investigation of an chemical manufacturing facility in New Jersey. The project included on-site remedial investigations of soil and groundwater in various areas of concern (VOCs, SVOCs, Mercury, Arsenic), evaluation of remedial alternatives, pilot test activities (groundwater extraction) and submission of a Remedial Action Workplan and NJPDES-DWG permit application. Following NJDEP approval of the work plan, work activities included offsite soil delineation sampling, advancement of HRC/ORC grout injection borings, and quarterly groundwater monitoring (over 4 years) to demonstrate the occurrence of natural attenuation, Baseline Ecological Evaluation (BEE), and establishing a Classification Exception Area (CEA) for the site.

Hempel (USA) Inc., Hydrocarbon and Metals Contamination Investigation – Wallington, NJ (Project Manager: 1995-1999; 2001 – 2005)

Mr. Goeller served as Project Manager for an ISRA investigation of a paint manufacturing facility in New Jersey. The project included various on-site soil boring programs, an off-site background soil study to confirm the presence of historical fill contamination, passive and active recovery of LNAPL (mineral spirits/toluene), evaluation of remedial alternatives, remedial pilot studies (groundwater extraction, soil vapor extraction and air sparging, dual phase extraction) and submission of a Remedial Action Workplan in accordance with New Jersey Technical Requirements. Work activities also included the permitting, installation and operation of a soil and groundwater remediation system (air

sparging and SVE). Planned work activities include establishing a Classification Exception Area (CEA) for the site, preparation of a deed notice, installation of fencing and an asphalt capping to address soil contamination.

Expert Witness Testimony

Stearns & Foster, Environmental Litigation Support – South Brunswick, NJ (Expert Witness: 1998)

Mr. Goeller acted as an expert witness for a deposition. Prepared for and provided testimony on our client's behalf to discuss various details and aspects of the remedial investigation being conducted at the South Brunswick, NJ site. The basis for this litigation was to recover the remediation costs from the previous property owner.

Groundwater Collection and Treatment

Former EcoPump Facility, DNAPL Contamination Investigation – South Plainfield, NJ (Project Manager: 1995 – 1997)

Mr. Goeller served as Project Manager for chlorinated hydrocarbon investigation and remediation of bedrock aquifer located beneath a former manufacturing site in New Jersey. This project required the operation and maintenance of a groundwater remediation system, quarterly groundwater sampling and system sampling. The remedial design included three groundwater extraction wells screen in bedrock, four injection wells, and treatment using a low-profile air stripper and activated carbon.

Shell Oil Company, Hydrocarbon Contamination Investigation – Bedford, NY (Project Hydrogeologist: 1990 – 1991)

Mr. Goeller served as Project Hydrogeologist for petroleum hydrocarbon contamination investigation at a service station site in New York. This project required remedial investigation and action to address five residential wells impacted by gasoline contamination. The remedial design included a dual phase multiple point extraction (groundwater and soil vapor). The groundwater treatment included a packed tower air stripper and a granular activated carbon unit. Operation of the remediation system provided a significant reduction in the hydrocarbon levels of the neighboring residential wells.

Shell Oil Company, Hydrocarbon Contamination Investigation – Metuchen, NJ (Project Hydrogeologist: 1990 – 1992)

Mr. Goeller served as Project Hydrogeologist for petroleum hydrocarbon contamination investigation at a service station site in New Jersey. Liquid-phase hydrocarbon accumulations in on- and off-site wells ranged from two to four feet thick. Project required remedial investigation and remedial action. Remedial design included an initial product skimming from multiple well points and subsequent system modification to include groundwater remediation (oil/water

separator, air stripper and activated carbon). Operation of the groundwater remediation system provided hydrodynamic control of the hydrocarbon plume.

Shell Oil Company, Hydrocarbon Contamination Investigation – NJ (Project Hydrogeologist: 1991 – 1992)

Mr. Goeller served as Project Hydrogeologist for petroleum hydrocarbon investigation at a service station site in New Jersey. This project required a remedial investigation and action. Eight monitoring wells were installed to delineate the areal extent of contamination. The remedial design included the installation of an interceptor trench and two recovery wells to capture the groundwater contaminant plume. The groundwater treatment system consisted of an oil-water separator and two granular activated carbon units. Groundwater monitoring of the site indicated that the contaminant plume was under hydrodynamic control.

Litigation Support

Porzio, Bromberg & Newman, Environmental Insurance Recovery – Wallington, NJ (Project Manager and Project Hydrogeologist: 1998 – 1999)

Mr. Goeller served as Project Manager and Project Hydrogeologist to provide technical assistance in recovering insurance monies for environmental damages incurred at a NJ site. Mr. Goeller performed a detailed evaluation of recent and historical data to develop a chronological sequence of events leading up to the present state of site contamination. Prepared several color graphic displays and gave convincing presentations to the property owner's insurance companies. Ultimately, the insurance companies paid the claim amounts specified by the property owner.

Island Transport, Environmental Insurance Recovery – Towaco, NJ (Project Hydrogeologist: 2006)

Mr. Goeller served as Project Hydrogeologist to assist in the development an expert report for environmental damages incurred at a gasoline service station site. The gasoline station has a long history of petroleum impacts. During a more recent fuel delivery, the client's representative accidentally spilled a small amount of fuel on the tank pad. While immediate remedial actions were conducted to address the minor spillage, the property owners and the NJDEP require the client to now share in all future remedial expenditures incurred at the site. Mr. Goeller performed a detailed evaluation of recent and historical data to develop a chronological sequence of events leading up to the present state of site contamination and summarized the historical investigation documents.

Multi-Phase Extraction

Stanley Tools, Hydrocarbon Remedial Investigation – Newark, NJ (Task Manager and Project Hydrogeologist: 1995 – 1999)

Mr. Goeller served as Task Manager and Project Hydrogeologist for a chlorinated and petroleum hydrocarbon contamination investigation at an abandoned industrial facility in the ironbound section of Newark, New Jersey. Chlorinated hydrocarbon contamination was present in the groundwater of the unconsolidated and bedrock aquifers. The initial remedial effort included a tidal study and passive and active recovery of LNAPL accumulations in on- and off-site wells. In some areas, the LNAPL thicknesses in the wells exceeded one foot. This project required the design and implementation of a LNAPL recovery program to reduce the migration potential to an off-site receptor. To expedite site closure, a multiple point, vacuum-enhanced groundwater extraction system was designed and installed to remediate impacted soil and groundwater. In addition, development of a remedial strategy for the chlorinated plume in the groundwater (investigation of a production well, additional monitoring and characterization of the aquifers, development of alternate cleanup levels) was necessary. Developed a technical argument which supported natural attenuation monitoring of the chlorinated plume.

Star Enterprise (Texaco), Hydrocarbon Contamination Investigation – Freehold, NJ (Project Hydrogeologist: 1992 – 1993)

Mr. Goeller served as Project Hydrogeologist for petroleum hydrocarbon investigation at a service station site in New Jersey. This project required a remedial investigation and action. Thirteen monitoring wells were installed to delineate the areal extent of contamination. Short term pumping tests were conducted at several wells for aquifer characterization. The remedial design included five recovery wells to capture the groundwater contaminant plume and a soil vapor extraction system to remediate the source area beneath a fuel dispenser island. The groundwater treatment system consisted of an oil-water separator and two granular activated carbon units.

Amoco Oil Company, Hydrocarbon Contamination Investigation – Bernardsville, NJ (Project Hydrogeologist: 1992 – 1993)

Mr. Goeller served as Project Hydrogeologist for petroleum hydrocarbon investigation at a service station site in New Jersey. This project required a remedial investigation and action. Eight monitoring wells were installed to delineate the areal extent of contamination. Short term pumping tests were conducted for aquifer characterization. The remedial design included five recovery wells to capture the groundwater contaminant plume. The recovery points were designed to act as combined groundwater and soil vapor extraction points. The mobile treatment system consisted of an oil-water separator and two granular activated carbon units. Vapor-phase carbon was used for the soil vapor extraction system.

Exxon Company U.S.A., Hydrocarbon Contamination Investigation – Hamilton, NJ (Project Hydrogeologist: 1991 – 1992)

Mr. Goeller served as Project Hydrogeologist for petroleum hydrocarbon contamination investigation at a service station site in New Jersey. Project required the operation and maintenance of a single point hydrocarbon recovery system. The system facilitated a 95% reduction in soluble hydrocarbon levels in a six-year time period. The recovery system was eventually upgraded to include a soil vapor extraction system (with vapor-phase carbon treatment) to address the residual hydrocarbon within the subsurface sediments.

Oil Spill Cleanup**New Jersey Turnpike Authority, Emergency Response Investigation, Various Service Areas Along NJ Turnpike (Project Manager and Project Hydrogeologist: 1993 – 1995)**

Mr. Goeller served as Project Manager and Project Hydrogeologist for petroleum hydrocarbon investigations at various NJTA facilities in New Jersey. The services provided included emergency response, UST and piping release assessment, supervision of UST system repairs, preparation of NJDEP Discharge Confirmation Reports, product sampling and analysis and submission of monthly activity reports.

NJ Transit, Remedial Investigation – Bay Head, NJ (Project Manager and Senior Technical Reviewer: 2001 – 2003)

Mr. Goeller acted as Project Manager and senior technical reviewer for this project. Work activities included conducted subsurface investigations (geoprobe soil borings and temporary wells) to delineate the extent of petroleum hydrocarbons, groundwater modeling (Modflow, TIMES) to simulate static conditions, predicted dewatering conditions and product plume movement as well as remedial investigation report and remedial action workplan development.

Remedial Investigation/Feasibility Studies (RI/FS)**PPG Industries, Inc., Remedial Investigation – Jersey City, NJ (Project Manager: 2002 – 2005)**

Mr. Goeller acted as Project Manager for a high-profile, hexavalent chromium site in Jersey City, NJ. Site formerly operated as an manufactured gas plant (PSEG) and later as a chromate waste production facility (1924-64). The RI work was required to fully comply with an Administrative Consent Order established with the NJDEP. The RI phase was designed to comply with NJDEP Technical Requirements and to expedite the site characterization process. RI consisted of installation of soil borings (100+), temporary well points (12), shallow and intermediate monitoring wells (16), collection of concrete cores from building foundations, field laboratory analysis of hexavalent chromium, periodic groundwater sampling and hydraulic characterization testing. Analytical suites for specific media included VOCs, SVOCs, PEST/PCBs, Metals and parameters to assess the potential for natural attenuation. Data validation was also performed on

all sampling reports and in many cases, facilitated the re-analysis of some samples to achieve the appropriate PQLs. A database was established for the project and three-dimensional data visualization were developed to assist the client in evaluating future remedial options. A final RI report was developed for submission to the NJDEP.

USEPA, CERCLA Site Investigation, Kentucky Avenue Wellfield – Elmira, NY (Project Geologist and RI Leader: 1988 – 1989)

Mr. Goeller served as Project Geologist and eventually RI Leader for a remedial investigation (under the ARCS II contract) of dense non-aqueous phase liquid (DNAPL) and metal contamination in a locally used aquifer. Seven potentially responsible sites were investigated. Investigation activities included soil gas surveys, implementation of a soil boring program, installation of multiple depth monitoring wells, and sampling of groundwater, surface water and sediment for traces of contamination. A municipal landfill was also investigated (geophysical survey, test pits, soil borings) during these activities. Developed workplans, subcontracts, remedial investigation report and developed remedial strategy to address site contamination.

USEPA, CERCLA Site Investigation, Wells G&H – Woburn, MA (Project Geologist and Field Operations Managers: 1987 – 1988)

Mr. Goeller participated in remedial investigations at five USEPA Superfund sites (under the REM III contract) in an area north of Boston, Massachusetts, on behalf of the USEPA. Mr. Goeller acted as Field Operations Manager and Project Geologist for a remedial investigation of DNAPL contamination in an aquifer system used by the town of Woburn. Investigation activities included installation of multiple depth cluster wells, sampling of groundwater, stream and sediment sampling, and soil sampling in suspected sources areas. Additional project responsibilities entailed subcontractor oversight, USEPA interaction, sample management and field activity documentation.

USEPA, CERCLA, Millington Asbestos Dump – Millington, NJ (Project Geologist and USEPA Field Representative: 1987)

Mr. Goeller acting as USEPA field representative and Project Geologist to provide field oversight of a Potentially Responsible Party's consultant. The site was formerly owned by an asbestos manufacturer. An asbestos dump was located adjacent to a nearby stream, releasing asbestos into the local surface water and groundwater systems. Mr. Goeller oversaw and documented various remedial investigation activities including boring and well installation, groundwater sampling and stream sampling. Mr. Goeller also collected numerous split-samples and prepared oversight reports to document regulatory compliance.

USEPA, CERCLA, Sarney Farm – Amenia, NY (Project Geologist: 1988 – 1989)

Mr. Goeller served as Project Geologist at this Superfund site in Amenia, New York. The site had numerous buried drums located in several acres of rural,

wooded property. A former owner used a 35-acre section of the property as a dump for municipal and industrial wastes without permits. During the remedial investigation, Mr. Goeller conducted the installed monitoring wells, provided oversight of geophysical surveys to locate potentially buried drums of waste, directed test pit investigations to locate and sample contents of buried drums and supervised buried drum removal activities.

USEPA, CERCLA, Fulton Terminal – Fulton, NY (Project Geologist: 1989)

Mr. Goeller served as Project Geologist for remedial investigation of a Superfund site in New York. Activities included installation of soil borings and monitoring wells and periodic groundwater sampling.

USEPA, CERCLA, NL Industries – Pedricktown, NJ (Project Geologist and USEPA Field Representative: 1988 – 1989)

Mr. Goeller acting as USEPA field representative and Project Geologist to provide field oversight of a Potentially Responsible Party's consultant. The site was a former lead smelting plant. Acted as USEPA oversight representative to document RI activities being conducted by the NL Industries consultant. Mr. Goeller collected numerous split samples and prepared periodic oversight reports for submission to USEPA.

USEPA, CERCLA, Marathon Battery – Cold Spring, NY (Project Geologist: 1988)

Mr. Goeller served as Project Geologist for remedial investigation of a Superfund site in New York. The former industrial site was impacted by heavy metals. Mr. Goeller participated in a week long groundwater pumping test for aquifer characterization. Pumping test results were used for future remedial design.

USEPA, CERCLA, Warwick Landfill – Warwick, NY (Project Geologist: 1989)

Mr. Goeller served as Project Geologist for remedial investigation of a Superfund site in New York. The site was a municipal landfill that had impacted local surface water bodies and groundwater. Mr. Goeller developed various workplans for phases of a remedial investigations and prepared subcontract documentation.

USEPA, CERCLA, Reich Farm – Brick, NJ (Project Geologist: 1987)

Mr. Goeller served as Project Geologist for remedial investigation of a Superfund site in New Jersey. Historical dumping at the site resulted in impacting the groundwater and numerous potable wells. Mr. Goeller evaluated site data, developed hydrogeologic cross-sections, isoconcentration maps, data summary tables and developed the RI report.

USEPA, CERCLA, Claremont Polychem – Old Bethpage, NY (Project Geologist: 1988)

Mr. Goeller served as Project Geologist for remedial investigation of a Superfund site in New York. Historical dumping activities at this site resulted in groundwater contamination. Mr. Goeller acted as a Project Geologist for various remedial

investigation activities (soil gas survey, soil boring investigation, groundwater sampling).

USEPA, CERCLA, Vineland Chemical – Vineland, NJ (Project Geologist: 1989)

Mr. Goeller served as Project Geologist for remedial investigation of a Superfund site in New Jersey. The former manufacturing site is located in the New Jersey Pinelands which is a Class I aquifer area. Mr. Goeller developed portions of RI workplans and subcontractor agreements for utilization by field team.

USEPA, CERCLA, Bog Creek – Howell Township, NJ (Project Geologist: 1989)

Mr. Goeller served as Project Geologist for remedial investigation of a Superfund site in New Jersey. Mr. Goeller developed draft RI workplans and subcontractor agreements for various phases of remedial investigation.

Pennsylvania Electric, Remedial Investigation – Erie, PA (Project Geologist: 1989)

Mr. Goeller served as Project Geologist for a remedial investigation of a coal-supplied, electric power plant. The remedial investigation (plant closure assessment) was conducted prior to decommissioning the plant. Mr. Goeller oversaw the installation of soil borings and monitoring wells around the operational plant (including lagoons, coal piles and neighboring properties). Mr. Goeller worked closely with plant staff to avoid impacting utilities and ensure proper placement of boring locations.

Jersey Central Power & Light, Site Investigation – Sea Isle City, NJ (Project Geologist: 1988)

Mr. Goeller served as Project Geologist for this project. Activities completed by Mr. Goeller included data evaluation, data validation, and development of workplans and subcontract agreements for investigation activities.

Jersey Central Power & Light, Site Investigation – Glen Gardner, NJ (Project Geologist: 1988)

Mr. Goeller served as Project Geologist for this project. Activities included data evaluation and development of workplans for investigation activities.

Sediment Sampling

HMDC, Hackensack River Study – Hackensack Meadowlands, NJ (Chief Geologist/Geochemist: 1986 – 1987)

Mr. Goeller served as Chief Geologist/Geochemist for a fisheries inventory performed on the Hackensack River. This project was commissioned by Hackensack Meadowlands Development Commission (currently known as the New Jersey Meadowlands Environmental Research Institute) and it included sampling, analyzing, and evaluation of river sediments for grain size and heavy

metal concentration. The sediment sampling results from this investigation complemented biota sampling results and provided a baseline ecological assessment of the river system.

Site Characterization

GATX SI, Inc., Remedial Investigation – Staten Island, NY (Senior Project Hydrogeologist: 2001 – 2002)

Mr. Goeller served as Senior Project Hydrogeologist for a remedial investigation of a 440-acre oil storage facility in Staten Island. The work was conducted in accordance with an approved Workplan under an AOC with the NYSDEC. Mr. Goeller developed the technical work scope and cost estimate to implement the contaminant delineation program. The field program developed by Mr. Goeller included the fast-track delineation of over 35 petroleum impacted soil and groundwater areas of concern (AOCs) and use of an innovative on-site screening method for VOC and PAH impacts in soils and groundwater. The AOCs were completely delineated in one mobilization within 1-month. Final deliverable to the client included a remedial investigation report that made recommendations for areas that could potentially be considered for Monitored Natural Attenuation (MNA). The report was prepared in a format to be submitted to the NYSDEC.

SEMPRA, Limited Phase II Site Assessment – Port of Albany, NY (Project Manager: 2006)

Mr. Goeller served as Project Manager for a limited Phase II Site Assessment of a 35-acre oil storage facility located on the Hudson River. The facility included a marine terminal, a former petroleum topping plant, a tank truck loading area, on and off-site railroad loading areas, and more than 30 above storage tanks. Mr. Goeller developed the technical work scope and managed the implementation of the expedited field program. The objective of the site assessment was to determine the soil and ground water quality beneath existing facility structures and historical spill areas. Activities performed included historical document review and summarization, soil boring installation and sampling, temporary well installation and sampling, and sampling of existing wells. Based on the results, Mr. Goeller prepared an evaluation of potential remedial alternatives that could be employed to address the primary environmental conditions identified at the site and developed several cost estimates that offered a range of remedial strategies for specific areas of concern. The final deliverable provided to the client enabled them to make a business decision on the future purchase of the property.

Soil Vapor Extraction/Bioventing

Shell Oil Company, Hydrocarbon Contamination Investigation – Hopelawn, NJ (Project Hydrogeologist: 1990 – 1992)

Mr. Goeller served as Project Hydrogeologist for petroleum hydrocarbon investigation at a service station site in New Jersey. This project required an expedited remedial investigation and subsequent remedial action. Gasoline

vapors were discovered in the storm sewer catch basins of a neighboring residential area. The NJDEP Enforcement Element assumed the nearest upgradient service station was responsible for the vapor problem and required immediate action. Mr. Goeller interacted with the NJDEP and initiated field activities to address the site conditions. A regenerative blower was immediately placed over the most odoriferous catch basin to remove the vapors from the residential area. Mr. Goeller supervised the installation of twenty monitoring wells and piezometers around the service station and in the wooded area along the storm sewer system to determine the groundwater flow regime and the distribution of the groundwater contamination. Based on the results of the investigation, it was determined that another upgradient service station was actually responsible for the vapors within the storm sewer system.

Shell Oil Company, Hydrocarbon Contamination Investigation – Northvale, NJ (Project Hydrogeologist: 1990 – 1991)

Mr. Goeller served as Project Hydrogeologist for petroleum hydrocarbon investigation at a service station site in New Jersey. This project required a remedial investigation and remedial action. A neighboring property owner reported gasoline vapors entering their basement. As a result, immediate remedial investigation of the site conditions was initiated and soil vapor extraction points were installed into the shallow bedrock along the property boundary. A regenerative blower was operated to remove the vapors. Eight monitoring wells were installed to delineate the areal extent of the groundwater contamination. Following the removal of the source area (tank field), the vapor levels significantly decreased.

Soil Vapor Surveys

U.S. Air Force Base, Site Characterization Survey (Soil Gas), POL Maintenance Facility, MAFB – NJ (Project Manager: 1995 – 1996)

Mr. Goeller served as a Project Manager for a 375-point soil gas survey over an active aircraft parking apron at a U.S. government base. The survey was intended to characterize the soil quality in the area of a proposed hydrant fueling system. Direct - push technology was utilized to collect soil gas samples for volatile organic analysis at a mobile laboratory. This project included establishment and clearance of sample locations, coordination with base personnel, supervision of subcontractors, documentation of all field activities, field evaluation of soil gas results, transmission of preliminary results to the client, and report preparation.

Transportation, Disposal

CB Richard Ellis, Elevator Repair/Hydraulic Waste Removal – Somerset, NJ (Project Manager: 1999)

Mr. Goeller acted as project manager for the repair of a passenger elevator and the removal of hydraulic waste. The hydraulic lift system of a passenger elevator experienced a loss of thirty-six gallons of hydraulic fluid. Once the elevator car

and piston were removed, approximately 495 gallons of hydraulic oil waste (oil, water and sand) were removed from the elevator casing. Given that the elevator casing shaft intersected the bedrock aquifer, a groundwater investigation was recommended to assess the environmental impact.

CB Richard Ellis, Elevator Repair and Hydraulic Waste Removal – Somerset, NJ (Project Manager: 1999)

Mr. Goeller acted as project manager for the repair of a freight elevator and removal of hydraulic waste. The hydraulic lift system of a freight elevator in an office building experienced a loss of an unknown quantity of hydraulic oil. Once the elevator car and piston were removed, approximately 850 gallons of hydraulic waste (oil, water and sand) were removed from the elevator casing. Because the elevator casing shaft intersected the bedrock aquifer, a groundwater investigation was proposed to assess the impact of the release.

UST Investigation and Remedial Action

New Jersey City University, UST Site Investigation – Jersey City, NJ (Project Manager: 2001 – 2002)

Mr. Goeller acted as Project Manager for a Site Investigation at two university-owned residential properties in Jersey City. The site investigation was intended to confirm the absence of impact from former fuel oil USTs. Based on the results, the SI reports presented a strong technical argument for case closure at both locations.

United Airlines, UST Compliance Upgrade – Newark Airport, NJ. (Project Manager: 1997 – 1999)

Mr. Goeller acted as project manager for a site located at Newark Airport. Mr. Goeller identified and coordinated the implementation of underground storage tank upgrade activities required to achieve regulatory compliance. The upgrade activities included repair of piping and spill containment sleeve, installation of alarms, fill port drop tube, signage, and bollard posts, integrity testing, and regrading ground surface for proper drainage. UST Compliance document was also prepared for the facility staff to use regularly maintain and monitor the equipment in accordance with State and Federal requirements

AlliedSignal, Hydrocarbon Contamination Investigation – Morristown, NJ (Project Manager and Hydrogeologist: 1996 – 1997)

Mr. Goeller served as Project Manager and Hydrogeologist for petroleum hydrocarbon investigation at a large estate (extensive property with several dwellings) in New Jersey. This project required the closure of four underground storage tanks (fuel oil) and the collection of post-excavation samples as prescribed in the closure plans. Site assessment summary reports were prepared for each UST and submitted to the NJDEP. All four sites received No Further Action letters from NJDEP.

Public Storage Inc., Hydrocarbon Contamination Investigation – North Bergen, NJ (Project Manager: 1997 – 1998)

Mr. Goeller served as Project Manager for a petroleum hydrocarbon investigation at a storage facility in New Jersey. This project included a geophysical survey, monitoring well installation, a test pit investigation, soil and groundwater sampling, a UST closure and report preparation.

Federal Realty Trust, Hydrocarbon Contamination Investigation, Troy Hills – Parsippany, NJ (Senior Project Hydrogeologist: 1997 – 1998)

Mr. Goeller provided technical support for a petroleum and chlorinated hydrocarbon investigation at a shopping mall in New Jersey. Mr. Goeller developed work plans for monitoring well installation, test pits, soil and groundwater sampling, UST closures and report preparation. Mr. Goeller also developed a remedial strategy to address the chlorinated hydrocarbon contamination.

Bayonne Industries, Hydrocarbon Remedial Investigation – Bayonne, NJ (Task Manager and Project Hydrogeologist: 1993 – 1997)

Mr. Goeller served as Task Manager and Project Hydrogeologist for a petroleum hydrocarbon investigation at a bulk liquid petroleum storage facility in New Jersey. This project included a site-wide remedial investigation of multiple product storage areas, tidal studies, interim remedial measures (product recovery, bulkhead restoration, sediment investigation) and bioremediation of a waste pond.

U.S. Air Force Base, Hydrocarbon Contamination Investigation, Four Separate Buildings at MAFB – NJ (Project Hydrogeologist: 1993 – 1995)

Mr. Goeller served as the Project Hydrogeologist for petroleum hydrocarbon contamination investigations at four separate U.S. government facilities in New Jersey. Project required the management and implementation of four separate Site Investigations around former underground storage tank areas and the completion of Site Investigation reports. Investigation activities completed by Mr. Goeller included well installation, soil boring advancement, surface and subsurface soil sampling, and groundwater sampling.

New Jersey Bell, Hydrocarbon Contamination Investigation – NJ (Project Hydrogeologist: 1991)

Mr. Goeller acted as Project Hydrogeologist for petroleum hydrocarbon investigations at three telephone facilities in New Jersey. This project required the closure of USTs and collection of post-excavation samples as prescribed in the closure plans. A groundwater monitoring well was installed at each UST site. A site assessment summary report was prepared for each UST and submitted to the NJDEP. The NJDEP issued No Further Action letters for these sites.

Shell Oil Company, Hydrocarbon Contamination Investigation – Manahawkin, NJ (Project Hydrogeologist: 1991)

Mr. Goeller served as Project Hydrogeologist for petroleum hydrocarbon investigation at a service station in New Jersey. This project required the closure of USTs and collection of post-excavation samples as prescribed in the closure plan. A site assessment summary report was prepared and submitted to the NJDEP. Based on the results of the assessment, a groundwater investigation was required. Eight monitoring wells were installed to delineate the contaminant plumes.

Star Enterprise (Texaco), Hydrocarbon Contamination Investigation – Jersey City, NJ (Project Hydrogeologist: 1991)

Mr. Goeller served as Project Hydrogeologist for petroleum hydrocarbon investigation at a service station in New Jersey. This project required the closure of a UST and collection of post-excavation samples as prescribed in the closure plan. A site assessment summary report was prepared for the site and submitted to the NJDEP.

Atlas Supply Company, Hydrocarbon Contamination Investigation – Springfield, NJ (Project Hydrogeologist: 1990 – 1992)

Mr. Goeller acted as the Project Hydrogeologist for petroleum hydrocarbon and chlorinated hydrocarbon investigation at a Quality Assurance Testing Laboratory in New Jersey. This project required a remedial investigation following the closure of an underground storage tank at the site. Mr. Goeller oversaw the installation of eight monitoring wells across the site and the implementation of a short term pumping test to determine potential aquifer yield. Low levels of petroleum hydrocarbon compounds and high levels of chlorinated hydrocarbon compounds were detected in the bedrock aquifer. Based on the results of the investigation, it was determined that the groundwater contamination was attributed to an upgradient historical source (an old landfill). The NJDEP eventually granted a conditional No Further Action letter.

TORCON, Inc., UST Closure Assessment – Westfield, NJ (Project Manager: 1999)

Mr. Goeller acted as project manager for the closure of an underground storage tank (UST) containing gasoline. The closure was initiated to comply with the state and Federal requirements. A thirty-year old UST had been used by the facility to dispense fuel to its fleet of company vehicles. During excavation and removal of the tank, groundwater impacts were observed. A initial screening water sample showed gasoline constituents above the applicable remediation standard. As required, a groundwater investigation was proposed to assess the impact and delineate the extent of the contaminant plume.

**CB Richard Ellis/Wellsford, UST Closure Assessment – Somerset, NJ
(Project Manager: 1998)**

Mr. Goeller acted as Project Manager for an the closure of a 10,000 gallon underground storage tank. The tank was installed in 1984 and used for No.2 fuel storage to operate a backup generator for an office building. The closure was initiated to comply with the state and Federal requirements. During removal, groundwater and a sheen were observed in the tank excavation. The initial screening water sample collected from the excavation indicated that only one constituent was above the applicable remediation standard. A groundwater monitoring well was installed in the excavation and sampled. The results indicated that the groundwater had not been impacted. A recommendation of "No further action" was provided in the closure report.

SPECIALIZED TRAINING

- OSHA 40-hour Health and Safety Training, 1987
- OSHA 8-hour Health and Safety Training, Annually Updated
- Rutgers University: Industrial Wastewater Treatment Operator's Course, February 1990
- NWWA: Design and Analysis of Aquifer Tests, March 1990
- General Physics: Bioremediation Engineering, March 1991
- Waterloo Centre for Groundwater Research: Migration and Remediation of Dissolved Organic Contaminants in Groundwater, February 1992
- American Petroleum Institute/USEPA: Assessment, Control and Remediation of LNAPL Sites, September 1994
- Rutgers University: Site Remediation-Work Within the Law, September 1994
- NJ Water Environment Association: UST Seminar, May 1995
- University Consortium Solvents-in-Groundwater Research Program: DNAPL Site Characterization and Remediation, December 1996
- Interstate Technical Regulatory Cooperation (ITRC)/PADEP: Natural Attenuation of Chlorinated Solvents in Groundwater, March 1998
- Rutgers University: UST Technical & Regulatory Training, June 1998
- ITRC/USEPA/RTDF: In Situ Permeable Reactive Barriers-Application and Deployment, September 1999
- ITRC/RTDF: Accelerated Bioremediation of Chlorinated Solvents, September 2000
- New Jersey Water Environment Association, Inc.: UST Recertification Training, May 2001
- Midwest Geosciences Group/UMASS: Improving Hydrogeologic Analysis of Fractured Bedrock Systems, June 2002
- Rutgers University: Regulatory Training in Underground Storage Tanks, March 2004
- USEPA/NGWA: Fractured Rock Conference, September 2004
- New Jersey Water Environment Association, Inc.: Technical and Regulatory Update – Groundwater, April 2005

- Rutgers University: Regulatory Training in Underground Storage Tanks, September 2006

PROFESSIONAL AFFILIATIONS

- American Institute of Professional Geologists
- Geological Association of New Jersey, New Jersey
- National Ground Water Association, New Jersey

PUBLICATIONS

Goeller, A.F. "Heavy Metals and Radionuclides in Hackensack River Sediments," Masters Thesis, Rutgers University, 1989.

Abstract. "Heavy Metals and Radionuclides in Hackensack River Sediments," *Hackensack River Symposium III: Fairleigh Dickinson University*, Teaneck, NJ, September 1989.

Abstract. "Heavy Metal Distribution in Hackensack River Sediments," *Three River Symposium, Mount Saint Vincent College*, New York, May 1988.

ELIZABETH A. DENLY

EDUCATION

B.A., Chemistry, University of New Hampshire, 1987

PROFESSIONAL REGISTRATIONS /CERTIFICATIONS

Licensed Site Professional Association, Massachusetts, Associate Member

AREAS OF EXPERTISE

Ms. Denly has 20 years of experience in:

- Quality Assurance/Quality Control
- Data Validation
- Laboratory Audits
- Gas Chromatography: Field and Laboratory Analyses
- Gas Chromatography/Mass Spectrometry: Field and Laboratory Analyses

REPRESENTATIVE EXPERIENCE

Quality Assurance/Quality Control

As a QA chemist at TRC, Ms. Denly is responsible for providing QA/QC oversight in support of a variety of environmental investigations including contaminant ambient air monitoring, human health and ecological risk assessments, risk-based soil cleanups, remediation programs, and delineation. Ms. Denly has provided this oversight under different regulatory programs, including MADEP, NYSDEC, NJDEP, Region I, Region II, Region III, and Region V. In this role, she has been responsible for the preparation of the project-specific QAPP, coordination with the laboratory, selection of the appropriate analytical methodologies needed to achieve the desired state or regulatory standards, oversight and performance of the data validation process, and determination of the usability of the data in comparison to the overall project objectives.

In addition, Ms. Denly serves as the TRC Eastern Region Quality Coordinator, responsible for the creation and implementation of the TRC Eastern Region Quality Management Plan.

Data Validation

Ms. Denly provides oversight and senior review on data validation performed for a variety of analytical parameters. She performs data validation for organic parameters including VOCs, SVOCs, Pesticides, PCB Aroclors, PCB homologues/congeners, dioxins, specialty analyses including GC/MS/SIM and various air analyses. Validation and reporting guidelines utilized include EPA National Functional Guidelines, EPA Regions I through V, NYSDEC, and NJDEP.

Ms. Denly developed internal protocols for the validation of the MA DEP EPH/VPH methodologies.

Woodbrook Road Superfund Site – South Plainfield, NJ (Project QA Officer: 2006 – Present)

Ms. Denly developed QAPP for complex remedial investigation under EPA Region II oversight. Program involves use of the TRIAD approach for real-time PCB results and sampling and analysis of soil, sediment, groundwater, and surface water for all TCL/TAL parameters, dioxins/furans, PCB congeners, and a variety of wet chemistry parameters, most of which will be used in a human health/ecological risk assessment. Providing oversight of three analytical laboratories and responsible for coordination of data validation for all parameters. She communicates frequently with the laboratories to ensure proper receipt of samples, proper utilization of project-specific analytical protocols in order to achieve necessary project action levels and to monitor the overall performance of the laboratories. Ms. Denly is responsible for the oversight and performance of field and laboratory audits.

130 Liberty Street – New York, NY (Project QA Officer: 2005 – Present)

Ms. Denly developed QAPP for extensive ambient air monitoring program and waste management program under EPA Region II oversight. Provide oversight of six analytical laboratories and responsible for coordination and performance of data validation for asbestos, metals, dioxins/furans, PAHs, PCBs, and silica ambient air data as well as TCLP and metals waste stream data. Communicate frequently with the laboratories to ensure proper receipt of samples, proper utilization of project-specific analytical protocols and to monitor the overall performance of the laboratories. Responsible for the oversight and performance of field and laboratory audits. Review all data prior to web-site posting and submission to EPA.

FAA, Region II – Atlantic City, NJ (Project QA Officer: 2002 – Present)

Ms. Denly assisted in the preparation of QA protocols for the Supplemental RI and Ecological Risk Assessment Work Plan. She was responsible for providing QA support to field team. Interfaced with laboratories to ensure achievement of risk-based standards. Performed data validation and/or oversight for all data generated. Ms. Denly provided oversight for all validation performed on Remedial Investigation data.

Mattiace Petrochemical – Glen Cove, NY (Project QA Officer: 2004 – Present)

Ms. Denly prepared QAPP for Long Term Remedial Action under TRC's Exit Strategy program using Region II guidance. She provided QA oversight to field team. Ms. Denly performed data validation of data generated for demonstration of achievement of cleanup objectives. Responsible for performing assessment of data to determine overall usability.

Region I Auto Body Shop Air Monitoring – Lawrence, MA (Project QA Officer: 2006 – Present)

Ms. Denly developed QAPP for air monitoring program for chemicals associated with spray painting operations under EPA Region I oversight. She provided oversight of analytical laboratories and responsible for data review of VOC and hexamethylene diisocyanate air data.

QWDC – Long Island City, NY (Project QA Officer: 2003 – Present)

Ms. Denly prepared QAPP for NYSDEC Voluntary Cleanup Program under TRC's Exit Strategy program. She provided QA oversight to field team. Ms. Denly performed data validation for the program. She was responsible for performing assessment of data to determine overall usability. Ms. Denly provided daily support to project team on chemistry, laboratory, and QA issues. She was responsible for ensuring project objectives are achieved by laboratory and for oversight of laboratory QA issues.

First Avenue – New York, NY (Project QA Officer: 2002 – Present)

Ms. Denly prepared a QAPP for Supplemental Soil Investigation and Voluntary Cleanup of four sites under TRC's Exit Strategy program. She provided QA oversight to field team. Perform data validation of select data points used for decision-making. Ms. Denly was responsible for performing assessment of data to determine overall usability for various Remedial Work Plans.

Region I Superfund RAC – MA (Lead Chemist: 2000 – Present)

Ms. Denly served as lead chemist for a variety of Superfund programs under the Region I Remedial Action Contract (RAC) as a subcontractor to Metcalf & Eddy. Her responsibilities include ongoing development of analytical specifications for laboratories to follow in order to achieve specific project objectives and development of QAPPs following the requirements of EPA Region I QAPP guidelines. She performs data validation and/or senior review of data validation for a variety of analytical methodologies utilizing EPA Region I validation guidelines. Ms. Denly generates data usability assessments and/or split sample comparison reports in accordance with EPA Region I guidance, when required. She interacts with EPA Region I chemists in the selection of analytical methodologies and project objectives. Ms. Denly provides QA oversight of PRP's validation reports, sampling and analysis plans, and QAPPs. She is responsible for providing QA oversight to field team, performing daily reviews of COCs and traffic reports, acting as the main liaison between Metcalf & Eddy and the field team and with EPA.

Various Brownfields Programs – Throughout MA (Project QA Officer: 2000 –Present)

Ms. Denly serves as Project QA officer for a variety of Brownfields programs performed throughout Massachusetts. Her responsibilities include development and approval of QAPPs, selection and oversight of laboratories, and providing a

final data usability assessment at the close of each project. Ms. Denly is responsible for providing QA oversight to field team and performing daily reviews of COCs.

Massachusetts Department of Environmental Protection – MA (QA Consultant: 2002 – Present)

Ms. Denly is responsible for performing review/evaluation of data packages for EPH/VPH analyses from laboratories selected by MassDEP as part of a Data Audit project to ensure compliance with the methods and CAM. She provided consultation to MassDEP for revisions to the MassDEP's innovative EPH/VPH analytical methods used to measure petroleum hydrocarbon concentrations in soil and groundwater. Ms. Denly served as a member of the Data Quality Enhancement Work Group lead by MassDEP and assisted in the development of a policy for achieving consistency of data reported under the MCP. Ms. Denly is designated as the Organic Subcommittee Chairperson responsible for generating the framework for QC parameters on organic analyses typically utilized under the MCP, method-specific performance standards for these QC parameters, minimum reporting requirements for the laboratories for each method, and a list of what laboratories need to keep on file for potential audits by the MassDEP. She is responsible for generating the final deliverable on all organic method requirements developed under this Work Group, providing significant input into the development of requirements for inorganic methods as well as field sampling QC requirements, and LSP data usability assessment requirements.

Greenfields Energy Company, Ltd. – WV (QA Coordinator: 1999 – 2000)

Ms. Denly served as QA coordinator for a Phase II Investigation at a former coal producing facility in West Virginia. She provided oversight to another consultant in the development of the QAPP. Interfaced with the laboratory to develop appropriate low level methodologies for groundwater samples in order to achieve West Virginia Groundwater Standards. Ms. Denly communicated daily with the laboratory to ensure samples received for proper analytical parameters. She also coordinated and performed data validation of all data for a complex mixture of organic and inorganic methodologies.

New Bedford Harbor – New Bedford, MA (Project QA Officer: 1998 – 2000)

Ms. Denly provided oversight of a laboratory which served as a QA laboratory for baseline analyses of air, groundwater, and sediment samples at a Superfund site under USACE and EPA Region I oversight. She is responsible for coordination and performance of data validation. Ms. Denly developed project-specific worksheets for the validation of PCB congener analyses of PUF/XAD samples by HRGC/HRMS using EPA Region I guidelines. She communicated frequently with the laboratory to ensure proper receipt of samples and proper utilization of project-specific analytical protocols and to monitor the overall performance of the laboratory. Ms. Denly is responsible for the generation of Chemical Quality Assurance Reports, comparing the results of the QA laboratory with those of a

primary laboratory. She communicated frequently with the USACE in regards to laboratory issues.

Allied Products – OH (QA Coordinator: 1999 – 2000)

Ms. Denly served as QA coordinator for a Supplemental Phase II Investigation under the Ohio Voluntary Action Program. She developed project-specific QAPP. Provided support to the project manager including the confirmation of proper QA/QC utilized in the field and laboratory as well as coordinating and performing data validation. Ms. Denly interfaced with the laboratory to select appropriate methodologies for low-level analyses in order to achieve Ohio MCLs.

Union Camp – Dover, OH (QAPP Author: 1998 – 1999)

Ms. Denly assisted in the development of a QAPP under Ohio EPA/Region V in support of a Corrective Measures Study ecological risk assessment. She was responsible for working with contracted laboratories in the development of acceptable analytical methods with very low detection limits for the determination of VOCs, SVOCs, pesticides, and PCBs in complex matrices.

Eagle Picher, OH (Project QA Officer: 1998 – 2000)

Ms. Denly assisted in the development of a QAPP under Ohio EPA/Region V in support of a SACM program. She provided detailed protocols for XRF field screening in QAPP. Coordinated analytical requirements with laboratory. Ms. Denly also provided oversight and performed data validation using EPA National Functional Guidelines.

Bay State Gas – Brockton and Taunton, MA (Project QA Officer: 1995 – 2000)

Ms. Denly served as quality assurance coordinator for Phase II investigations performed at various Bay State locations under Massachusetts Department of Environmental Protection regulations. She provided QA support to the field sampling team. Ms. Denly also coordinated and performed data validation and monitored laboratory performance. Interfaced with the laboratory to select appropriate analytical methodologies and sample cleanups in order to achieve low detection limits when samples exhibited high petroleum content.

Stanley Bostitch – East Greenwich, RI (QA Coordinator: 1995 – 2000)

Ms. Denly served as analytical coordinator for a large sampling program performed under Rhode Island Department of Environmental Management regulations. She provided QA support to the field sampling team. Ms. Denly coordinated and performed data validation and monitored laboratory performance.

BOC Gases – MA (QA Coordinator: 1997 – 1999)

Ms. Denly served as analytical coordinator for a Massachusetts Contingency Plan (MCP) Phase II investigation. She provided support to the project manager

including the confirmation of proper QA/QC utilized in the field and laboratory as well as coordinating and performing data validation. Ms. Denly assisted project manager in the selection of appropriate analytical methodologies (GC/MS/SIM) in order to meet the MADEP GW-1 standards. She also assisted the laboratory in developing specific QA/QC procedures to be utilized with the GC/MS/SIM analyses.

MADEP EPH/VPH Methodologies, Various Clients – MA (QA Consultant 1998 –2000)

Ms. Denly assisted several laboratories in the development and implementation of the recently published MADEP methodologies for the analysis of TPH. She performed intense review of laboratory data and convened with laboratory to discuss deficiencies and potential corrective action.

Field/Laboratory Analyses

Consolidated Edison Company, Electrical Power Generator – NY (Project Chemist: 1996)

Ms. Denly performed a method validation study to establish the applicability of an ASTM UV method for the measurement of dielectric fluids in soils. Detection limits, precision, accuracy, and comparability to laboratory analyses using MA DEP EPH methodology were investigated for each oil.

Consolidated Edison Company, Electrical Power Generator – NY (GC Analyst: 1995)

Ms. Denly prepared and analyzed soil samples for an RFI of the facility in Astoria, New York. She quantitatively identified samples for TPH by GC/FID. Ms. Denly performed qualitative identification of the soils based on analysis of several of categories of oils used at the facility, including fuel oil #2, fuel oil #6, transformer oil, gas condensate, and dielectric fluids.

Iron Horse Park, Bioremediation – Billerica, MA (Laboratory Analyst: 1995)

Ms. Denly developed extraction and analysis method to determine presence of low level petroleum hydrocarbons (C₁₀-C₃₂ normal alkanes and total unresolved TPH) and low level PAHs with their alkylated homologues. She employed GC/FID and GC/MS selective ion monitoring technologies for the analyses. Ms. Denly monitored degree of microbial biodegradation in samples via the quantitative evaluation of hopane in the PAH analysis and the pristane/phytane ratio in the TPH analysis.

Massachusetts Department of Environmental Protection – MA (Project Manager: 1998 – 2000)

Ms. Denly managed a program involving the development of an analytical approach for the analysis of volatile petroleum hydrocarbons in indoor air to support the MA DEP's risk-based approach to evaluating petroleum

hydrocarbons in air. She developed a list of target analytes and a QAPP for the program. Ms. Denly performed method detection limit studies for individual target analytes and hydrocarbon ranges in SUMMA canisters. She conducted a precision and accuracy study for individual target analytes and hydrocarbon ranges using an outside source. Ms. Denly also evaluated the method with real-world samples.

Cliffs Dow – Marquette, MI (Field GC/MS Chemist: 1995)

Ms. Denly provided on-site field analytical support during remediation of a site contaminated with wood tars. She utilized an aqueous extraction followed by analysis of headspace constituents for VOCs. Implemented a methylene chloride microextraction followed by GC/MS selective ion monitoring for PAH and phenolic compounds. Ms. Denly provided real-time information which was compared to site-specific clean-up criteria and used to guide the excavation and remediation process. Data correlated well with results from split samples sent to an off-site laboratory for analysis by CLP methodologies.

Allied Signal, Inc., Phenol and Acetone Manufacturer – PA (Field GC Chemist: 1994)

Ms. Denly provided on-site analytical support during a post-control emissions test under EPA's CAAA Early Reductions Program and Philadelphia Air Management Services (PAMS) Compliance Testing for a thermal oxidizer and catalytic oxidizer at the Frankford, Pennsylvania facility. She measured emissions of target Hazardous Air Pollutants (HAPs) in whole air samples using EPA Method 18. Ms. Denly provided on-site sample results as well as emission rates and removal efficiencies.

Compo Chemical Company, Former Adhesives Manufacturer – Mansfield, MA (Field Analytical Chemist: 1996)

Ms. Denly provided field analytical support during a Phase II investigation of a MA DEP listed site in Mansfield, Massachusetts which formerly manufactured adhesives. She analyzed soil samples on site using an aqueous extraction followed by a headspace analysis using a Photovac 10S plus portable GC, the results of which were used to delineate extent of contamination. Ms. Denly provided QA support and guidance during investigation. She prepared the QA Plan and ensured the implementation of QA requirements including field quality control and data validation.

CRREL – Hanover, NH (Field Chemist: 1998)

Ms. Denly conducted a quantitative tracer gas study with helium during two in-situ air sparging and soil vapor extraction pilot tests at the Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire. She was responsible for setup of all instrumentation, calibration of helium detector, calculations of flow rates, performance of a 100% recovery test, and measurement of helium detected over time.

Squibb Manufacturing, Pharmaceutical Company – Humacao, PR (Field GC Chemist: 1995)

Ms. Denly provided field analytical support for soil gas survey conducted as part of an RFI at the facility in Humacao, Puerto Rico. She analyzed soil gas samples in tedlar bags by direct injection, GC/FID techniques following the guidelines of EPA Method 18 for ten constituents of concern. Ms. Denly generated real-time data used to identify areas of release and select locations of soil remediation.

Sun Refining and Marketing Co., Oil Refinery – Yabucoa, PR (Field GC Chemist: 1994)

Ms. Denly organized and operated an on-site laboratory to support a fugitive emissions screening and bagging program of process equipment within ten process units at the facility in Yabucoa, Puerto Rico. She analyzed tedlar bag matrices following guidelines of EPA Method 18.

Malcolm Pirnie, Wastewater Treatment Facilities – New York City (Laboratory Analyst: 1992)

Ms. Denly refined, organized, and performed innovative analytical methodology used for a large scale program (over 800 samples) as part of a study of VOC air emissions from various wastewater treatment plants.

French Limited Superfund Site – Crosby, TX (GC/MS Analyst: 1987 – 1990)

Ms. Denly supported field bioremediation study work at a Superfund site in Crosby, Texas by analyzing tenax cartridge samples on perimeters of a contaminated lagoon. She conducted method development and analytical modifications to accommodate complex matrix effects resulting from flux chamber sampling techniques.

PUBLICATIONS AND PRESENTATIONS

Denly, E. Chapnick, S., *"Is Presumptive Certainty Generating Usable Data for Massachusetts Contingency Plan (MCP) Decisions?"* Paper presented at Twentieth Annual Conference on Contaminated Soils, Sediments and Waters, Amherst, MA. 2004.

Denly, E., Hoyt, M., Anastas, N., Fitzgerald, J., Hutcheson, M., McGrath, T., *"Massachusetts VPH Method Validation for Indoor Air Samples"*. Poster presented at Thirteenth Annual Conference on Contaminated Soils, Amherst, MA. 1998.

Denly, E. Hopper, D., *"Field Chemistry for PAHs and VOCs Applied to a Risk-Based Soil Cleanup at a Landfill"*, Paper presented at Fifth International Symposium on Field Analytical Methods for Hazardous Wastes and Toxic Chemicals, Las Vegas, NV. 1997.

Denly, E., Hoyt, M., Camp, W.H., Naughton, G., *"Method Validation Study for Field Screening of Dielectric Fluids in Soils"*, Paper presented at Twelfth Annual Conference on Contaminated Soils, Amherst, MA. 1997.

Denly, E., Wang, H., *"Preparation of Tedlar Bag Whole Air Standards with a SUMMA Canister for Field VOC Analysis"*, Poster presented at Fourth International Symposium on Field Screening Methods for Hazardous Waste and Toxic Chemicals, February 22-24, 1995, Las Vegas, NV.

SPECIALIZED TRAINING

- Data Evaluation for Vapor Intrusion Studies, 9/07
- Sediment Toxicity Testing: Methods to Achieve Strong Data Sets and Interpret Results, 6/07
- Assessing the Vapor Intrusion Pathway at Contaminated Sites, NHDES Waste Management Division, 4/05
- Perchlorate Webinar, US EPA, 2/05
- Improved Project Communication: Within and Outside of the Project Team, ASCE Continuing Education Program, 12/15/04
- Communicating with Tact and Skill for Managers and Supervisors, Rockhurst University Continuing Education Center, 2004
- Training Session for USACE-NAE/USEPA Region I Regional Implementation Manual, 10/7/04
- Training for Non-Trainers, US EPA, 9/04
- Overview of Statistical Data Quality Assessment, US EPA, 9/04
- Assessing Quality Systems, US EPA, 9/04
- Understanding and Evaluating Data Quality Assessments, US EPA, 9/28/04
- PowerPoint 2000 – Level 1, New Horizons Computer Learning Centers, 12/03
- EPA Forms II Lite Training Course, 9/23/03
- MA DEP: "Beyond TPH: Understanding and Using the New EPH/VPH Approach"
- Arthur D. Little: "Advanced Chemical Fingerprinting of Petroleum Contaminated Soils and Water"
- ACS Short Course: "How to Develop and Troubleshoot Capillary GC Methods"
- ORA/RSA Workshop: Optical Remote Sensing
- Finnigan MAT: "Basic Mass Spectral Interpretation"
- Finnigan MAT: "Advanced Environmental MS Interpretation"

DANIEL NACHMAN, CPG

EDUCATION

M.S., Geology, Oregon State University, 1977

B.A., Geology, New York University, 1973

PROFESSIONAL REGISTRATIONS/CERTIFICATIONS

Certified Professional Geologist, American Institute of Professional Geologists License (#6524)

Registered Geologist, Commonwealth of Virginia (#000425)

New Jersey Department of Environmental Protection (NJDEP) Subsurface Investigation, Underground Storage Tank (UST) (#001162)

Certified Emergency Medical Technician, New Jersey, 1997 to 2003

AREAS OF EXPERTISE

Mr. Daniel Nachman, CPG has 27 years of experience in the following general areas:

- Hydrogeology
- Site Investigation
- Ground Water Remediation
- Hazardous Waste Remediation
- Superfund and RCRA Corrective Action
- Litigation Support
- Ground Water Resource Development

REPRESENTATIVE EXPERIENCE

Mr. Nachman has over 27 years of experience in environmental and ground water supply consulting. His qualifications include evaluation of regional hydrogeologic regimes; design and management of multifaceted investigations and remedial efforts under state and federal environmental programs; development and management of ground water supplies, direction of technical and financial aspects of groups and offices; and litigation support. During his 17 years with Geraghty & Miller, Inc., Mr. Nachman implemented soil and ground water investigations in Puerto Rico, the U.S. Virgin Islands, New Jersey, New York, Pennsylvania and several other states; managed a variety of ground water supply and resource management projects; managed the firm's Hackensack, New Jersey and Santurce, Puerto Rico offices, and directed the firm's RCRA program. He currently serves as a Vice President in TRC's Millburn, New Jersey office, managing a group of 15 hydrogeologists and environmental scientists, directing a wide range of soil and ground water remedial projects and providing litigation support to our clients. Mr. Nachman teaches two hydrogeology courses annually through Rutgers University's continuing education program, and is fluent in Spanish.

Remedial Investigation

Woodbrook Road Superfund Site – South Plainfield, NJ (Project Director: 2003 – 2006)

Mr. Nachman serves as the Project Director for the RI/FS at this Superfund site under TRC's Exit Strategy program. His responsibilities include directing a multidisciplinary team; negotiating scope with the USEPA Region II; presenting the technical aspects of the project to various regulatory, municipal, and conservancy groups; and supporting TRC's efforts to enhance and conserve more than 100 acres of wetlands in the Dismal Swamp, one of the last extensive freshwater wetlands environments in northern New Jersey. The site is a former unlicensed dump site, with PCB hot spots. The RI/FS will include an evaluation of ecological and human health risks associated with PCBs in soil, sediment and surface water bodies, and use of real-time data analysis to guide delineation efforts at an accelerated pace, with the goal of completing a protective remedy that is integrated with the enhancement and preservation of a large wetlands tract.

Dover Township Landfill – Dover (Toms River), NJ (Project Director: 1997 – 2006)

Mr. Nachman serves as the Project Director for the RI at the closed municipal landfill, conducted under a Memorandum of Understanding (MOU) between Dover Township and the NJDEP. The RI included a thorough evaluation of the 3-dimensional ground water flow dynamics in a 200-foot thick sand aquifer, the delineation of a landfill leachate plume, the negotiation of delineation criteria for conventional and area-specific compounds of interest, and the presentation of RI findings at regular meetings of a cancer cluster committee. The RI included sophisticated investigative and computer modeling techniques to identify preferential contaminant migration pathways and design an optimal ground water monitoring network, and a baseline ecological evaluation to assess potential impacts of the landfill leachate plume on nearby streams. For 9 years, Mr. Nachman has served as the principal spokesperson for the Township in negotiations with the NJDEP and at public presentations.

Berlex Laboratories – Hanover, NJ (Project Director: 1997 – 2006)

Mr. Nachman is the Project Director for a RI and Remedial Action at the former pharmaceutical R&D facility. The RI included an evaluation of regional hydrogeologic and ground water contamination conditions to obtain a No Further Action (NFA) designation for ground water, and sufficient characterizations to obtain NFA designations for more than 25 other Areas of Concern (AOCs). The Remedial Action, the capping of a Historic Fill area with heterogeneous distribution of PCBs, was the result of precedent-setting negotiations with the USEPA and NJDEP. The approved capping remedy was the first nationwide under the federal TSCA Megarule.

Edgewater Enterprises – Edgewater, NJ (Project Director: 1998 – 2005)

Mr. Nachman directed this RI at a Brownfield site with extensive metals and DNAPL contamination. The NJDEP was initially requiring a costly soil excavation program. Based on negotiations with the NJDEP and the performance of a comprehensive soil and ground water investigation, impacted soils were capped in place and administered using engineering and institutional controls in accordance with an Administrative Consent Order. Mr. Nachman designed and directed a site-wide ground water RI to delineate arsenic in ground water and investigate geochemical controls on arsenic solubility and migration.

Former ExxonMobil Refineries – Linden and Bayonne, NJ (Project Director: 1992 – 1995; Project Advisor: 2004 – 2006)

Mr. Nachman directed RIs at the 1,300-acre Bayway Refinery in Linden, New Jersey and the 288-acre terminal in Bayonne, New Jersey for ExxonMobil. The projects included negotiations with the NJDEP, development of investigative strategies and techniques, characterization of complex hydrogeologic conditions and contaminant distribution in soil and ground water, data presentation, risk assessment, and evaluation of remedial alternatives. More recently, Mr. Nachman has served as an advisor in the evaluation of the hydrogeologic constraints affecting the performance of a large remedial system at the Bayway Refinery.

Sun Oil Company – Yabucoa, PR (Field Geologist: 1981 – 1983; Project Manager: 1984 -1987; Project Director 1988 – 1994)

Mr. Nachman implemented several projects at an oil refinery in Puerto Rico, including ground water exploration programs to augment the refinery's water supply; the modification and regular sampling of a RCRA monitoring well network; a subsurface investigation associated with a fuel spill; the modification of the facility's RCRA Part B permit application; and the review and critique of a RCRA Facility Assessment (RFA) prepared by the U.S. Environmental Protection Agency (USEPA)-Region II.

Former PPG Chemical Plant – Guayanilla, PR (Project Director: 1992 – 2004)

Mr. Nachman directed a RCRA Facility Investigation (RFI) at the decommissioned PPG Chemical Plant in Guayanilla, Puerto Rico. The project included the compilation and presentation of large volumes of data relating to historic site operations and the remediation undertaken after decommissioning, and the preparation of work plans for the investigation of the extent of residual volatile organic compounds (VOCs) in ground water. The RFI included ground water, soil, and sediment sampling, the implementation of aquifer pumping tests, the evaluation of intrinsic biodegradation processes, risk assessment, and remedial alternative analysis. Mr. Nachman assisted PPG in negotiations with the USEPA and the Puerto Rico Environmental Quality Board.

Former Cessna Facility – Boonton, NJ (Project Manager: 1987 – 1990; Project Director: 1991 – 2003; Expert Witness: 1992 and 1998)

Mr. Nachman directed a ground water contamination and remedial investigation at a closed RCRA-regulated facility in Morris County, New Jersey. Studies included delineation of two separate contaminant plumes, the design of recovery-well networks for the removal and treatment of contaminated ground water, and the design of injection-well networks for the reinjection of treated ground water. The project involved the preparation of permit applications for working in designated wetlands, the injection of treated water, and long-term remediation and monitoring. Mr. Nachman also served as an expert witness in two separate cost-recovery lawsuits.

GE, Vega Alta Superfund Site – Vega Alta, PR (Project Director: 1989 – 1994)

Mr. Nachman directed the Superfund RI in Vega Alta, Puerto Rico. The project involved the development of work plans for a source investigation at an industrial park and municipal landfill, and the compilation of regional hydrogeologic and water chemistry data for the construction of a 3-dimensional ground water flow and solute transport model in a complex limestone aquifer. The source investigation included magnetometer surveys, soil-gas surveys, exploratory borings, and a number of other tasks. Key issues related to the impact of potential remedial scenarios on the position of the saltwater/freshwater interface and the long-term viability of the public drinking water supply. Mr. Nachman made several presentations to Puerto Rico government agencies, in English and Spanish, regarding investigation and modeling results.

Ground Water Resource Development**Fox Development – Rockaway, NJ (Project Director: 1998 – 2006)**

Mr. Nachman directed a test well and aquifer testing program to develop public supply wells to be incorporated into the municipality's public supply well network. Mr. Nachman guided the preparation of two applications to modify the municipality's Water Allocation Permit, and successfully negotiated with the NJDEP for permit approval.

New Jersey American Water Company – Millburn, NJ (Project Manager: 1983 – 1987)

Mr. Nachman coordinated an extensive well-field rehabilitation program for a private water company in Essex County, New Jersey. The project included selection of well-development techniques and design of pumping tests to evaluate effectiveness of well redevelopment. The program resulted in the increase of individual well yields by as much as 300 percent.

The Government of the U.S. Virgin Islands (Principal Field Scientist and Researcher: 1982 – 1984)

Mr. Nachman coordinated and supervised an extensive investigation of existing and potential ground water resources for the government of the U.S. Virgin Islands, and prepared a ground water management plan for the three islands in coordination with the USEPA-Region II.

Puerto Rico Electric Power Authority – Aguirre, PR (Principal Field Scientist: 1979 – 1984)

Mr. Nachman carried out field investigations and supervised test drilling and pumping tests for expansion of the ground water supply system for the Puerto Rico Electric Power Authority power plant in Aguirre, Puerto Rico. He was responsible for data collection and supervision of test drilling at several proposed power-plant sites in Puerto Rico.

SPECIALIZED TRAINING

- RCRA Corrective Action Workshop on Results-Based Project Management, U.S. Environmental Protection Agency (USEPA), July 23, 1999.
- Occupational Health and Safety Training Program, Annual 8-Hour Refresher Course, 29 CFR 1910. 120, OSHA, 1998.
- Eight-hour OSHA Supervisor Health and Safety Training, 1991.
- Personal Computers in Groundwater Pollution and Hydrology, February 7-11, 1988.
- Problem Areas in Ground-Water Monitoring System Design for Hazardous Waste Management Facilities, USEPA Technology Transfer Seminar, November 20-21, 1986.
- Water Well Hydraulics, The College of Engineering, University of Wisconsin-Madison, January 6-10, 1986.
- Ground Water Pollution and Hydrology, Princeton Associates, July 12-16, 1982.

SELECTED PUBLICATIONS AND PRESENTATIONS

Nachman, D. "Natural Remediation: A Smart Approach to Cleanup," *Environmental Compliance & Litigation Strategy*, Vol. 13, No. 2. July 1997.

"Environmental Procedures in Property Acquisition," *Presented at New Jersey Institute for Continuing Legal Education Seminar (Environmental Issues for Lenders and Borrowers)*, Woodbridge, New Jersey, February 25, 1997 and Fairfield, New Jersey, March 26, 1997.

Nachman, D. "Overcoming Problems with Groundwater Cleanup." *Environmental Compliance & Litigation Strategy*, Vol. 11, No. 12, May 1996.

"Practical Aspects of Groundwater Resource Development - Puerto Rico," a Case Study. *Presented at the 15th Annual Symposium of Caribbean Geology, University of Puerto Rico, Mayaguez, Puerto Rico, February 23, 1996.*

"The Newest Groundwater Cleanup Technologies," *Presented at the 15th Annual Symposium of Caribbean Geology, University of Puerto Rico, Mayaguez, Puerto Rico, February 23, 1996.*

"Recent Innovations in In-Situ Technologies for Groundwater Cleanup," *Presented at the Chemical Industry Council of New Jersey Fall Regulatory Conference, New Brunswick, New Jersey, December 1995.*

"The Occurrence of Contamination in Groundwater," *Presented at Fundamentals of Groundwater Contamination and Remediation Techniques, a Geraghty & Miller/University of Wisconsin-Madison Groundwater Series Seminar, Washington, D.C., November 13, 1995.*

"Standards and Economic Issues - Soil and Water Control," *Presented at the 6th Annual Conference, Environmental Regulation in New Jersey, Institute of Business Law, Hasbrouck Heights, New Jersey, April 19, 1995.*

"New Jerseys Cleanup Standards- Practical Implications," *Presented at the Executive Enterprises Environmental Regulation Course, Woodbridge, New Jersey, March 1994.*

"Puerto Rico's Underground Storage Tank Regulations," *Presented (in Spanish) to the Puerto Rico Manufacturers Association, Santurce, Puerto Rico, 1992.*

"Streamlining Plume Delineation," *Presented at the American Society of Civil Engineers 1992 Annual Convention, New York, New York, September 16, 1992.*

"Technical Issues Typically Resulting from RCRA Implementation," *Presented at the Executive Enterprises Regulation Course, Chicago, Illinois, March 1992.*

"Wellhead Protection in New Jersey - Proactive Strategies through Industry," *Presented at seminar (Environmental Issues Facing New Jersey Business in the 1990s), Morristown, New Jersey, October 1991.*

"Water Sampling Protocols," *Presented at Conference on the Design and Execution of Sampling and Analysis Plans, sponsored by the New Jersey Water Pollution Control Association, the NJDEP and the USEPA, North Brunswick, New Jersey, March 23, 1988.*

SELECTED EXPERT TESTIMONY

Horvath/Toth Partnership vs. Harleyville Insurance Company, et al., Superior Court of New Jersey, Law Division, Middlesex County, Docket No. MID-L-9283-01. Provided testimony at trial.

Department of Transportation vs. R&C Realty Co., Superior Court of New Jersey, Law Division, Morris County, Docket Nos. MRS-L-464-93 and MRS-L-999-95.

Taylor Forge Stainless, Inc., and Michael W. Kearney vs. Viacom International Inc. and Conolog Corporation. Superior Court of New Jersey, Law Division, Somerset County, Docket No. SOM-L-1538-93.

A&D Holding Co., Inc. vs. Line Road Associates, et al., Superior Court of New Jersey, Law Division, Monmouth County, Docket No. Mon-L-2201-97. Provided testimony at trial.

The State of New Jersey, Department of Environmental Protection vs. C.L.M. Service Station, Inc., Robert Coyman; individually and doing business as A-Z Automotive, Spartan Oil Company, Inc., and Christopher Adamopolous. Superior Court of New Jersey, Chancery Division, Passaic County.

Benjamin Guzman Torres Inc., et al. vs. Esso Standard Oil Company, Inc. et al., Court of the First Instance of Puerto Rico, Civil No. JDP95-024(601). Mr. Nachman was deposed in Spanish.

Tennsco vs. Estey Metal Products, et al., U.S. District Court, District of New Jersey, Civil Action No. 96-1294 (GEB).

The Cessna Aircraft Company vs. The Hartford Company, et al., Superior Court of New Jersey, Law Division, Morris County, Docket No. MRS-L-3868-92. Provided testimony at trial.

Outlet City, Inc. vs. West Chemical Products, Inc., U.S. District Court, District of New Jersey, Civil Action No. 91-1564. Provided testimony at trial in Federal court as a fact witness.

Liquid Air Corporation and LAI Properties Inc., et al. vs. Ideal Gas Products, Inc. vs. Coudert Brothers, et al. and Kathleen Dolan vs. United Excavating Co., Inc., Superior Court of New Jersey, Law Division, Middlesex County, Docket No. L-3313-90.

Gussack Realty Co. and General Bearing Corporation vs. Xerox Corporation, U.S. District Court, District of New York, Case No. 95CW2157.

Garden Street Industries and Dreher, Inc. vs. Getty Petroleum, et al., Superior Court of New Jersey, Law Division, Essex County, Docket No. L-00930-95.

Hillside Realty vs. Primerica Corporation and American National Can Corporation, Superior Court of New Jersey, Chancery Division, Union County, Docket No. C 5682-88.

The Cessna Aircraft Company vs. Woodward Clyde Consultants vs. Trace Technologies, U.S. District Court, District of New Jersey, Civil Action No. 88-5232.

Bartell, et al. vs. Boettcher, et al., (Civil Action Docket No. C-7982-88) Superior Court of Court of New Jersey, Sussex County.

TEACHING AND ADVISORY POSITIONS

Geology, Hydrogeology and Chemistry – Learning the Basics for Environmental Applications. Coordinator and instructor, Short Courses and Continuing Professional Education, Rutgers University, Cook College, New Brunswick, New Jersey, October 2002, October 2003, October 2004., October 2005, October 2006.

Practical Applications in Hydrogeology, coordinator and instructor, Short Courses and Continuing Professional Education, Rutgers University, Cook College, New Brunswick, New Jersey May 1999, May 2000, May 2001, May 2002, May 2003, May 2004, May 2005, May 2006.

Contaminant Behavior and Remediation as part of Practical Applications in Hydrogeology (taught by Dan Raviv, Ph.D.), Short Courses and Continuing Professional Education, Rutgers University, Cook College, New Brunswick, New Jersey, May 1997 and May 1998.

Applied Hydrogeology (graduate level, co-taught with Vincent Uhl, Jr.), New Jersey Institute of Technology, Newark, New Jersey, Fall semesters 1986, 1987, 1988 and 1989.

Hydrogeologic Principles and Behavior of Contamination in Ground Water, guest lectures for Hazardous Waste Management (taught by Michael Mann), Stevens Institute of Technology, Hoboken, New Jersey, Spring 1985.

DAVID S. GLASS, PE

EDUCATION

M. E., Chemical Engineering, McGill University, 1986

B.A., Chemistry, Colby College, 1983

PROFESSIONAL REGISTRATIONS/CERTIFICATIONS

Professional Engineer, New York (No. 068884-1), 1992

Professional Engineer, New Jersey (No. 24GE04355100), 2001

Professional Engineer, Connecticut (No. 24856), 2005

Certified for UST Subsurface Evaluation and Closure, New Jersey (No. 483225)

AREAS OF EXPERTISE

Mr. Glass has extensive management and technical experience in the following areas:

- Remedial Design and Remedial Investigation
- Remedial Construction Management/Inspection
- Remedial System Operation and Maintenance
- Underground and Aboveground Storage Tank Management
- Soil Vapor Intrusion Mitigation
- Landfill Closure
- Regulatory Compliance

REPRESENTATIVE EXPERIENCE

Mr. Glass manages TRC's Environmental Remediation and Site Assessment Practice in the New York City office and has over 23 years of experience providing environmental engineering, investigation, design, construction phase and permitting services. He has managed many large, complex remedial investigations, feasibility studies, site assessments and remedial design and construction projects.

Mr. Glass has extensive experience with NYSDEC Region 2 in connection with investigation, remediation and close-out of contaminated sites. He has been responsible for engineering services in connection with inspection, testing, maintenance, spill prevention planning, remediation, closure and replacement of hundreds of storage tank systems in the New York City metropolitan area, including hazardous substance, hazardous waste and petroleum product storage tank systems.

Mr. Glass serves as an instructor at Rutgers University (Office of Continuing Professional Education) for the "Regulatory Training in Underground Storage Tanks" course. This course is required for individuals seeking NJDEP certification for installation, closure and testing of USTs and certification to install cathodic protection and perform subsurface evaluations in connection with USTs.

Mr. Glass supervised remedial design, engineering and construction phase consulting services provided under two separate “on-call” contracts to the New York State Department of Environmental Conservation (NYSDEC) and the New Jersey Department of Environmental Protection (NJDEP). This included managing a staff of geologists and engineers primarily in connection with remediating New York and New Jersey State funded (Superfund) sites.

Queens West Development, Stage 2 Site, Remedial Action – Long Island City, NY (Program Manager: 2005 – Present)

Mr. Glass was responsible for supervising the preparation of the Remedial Investigation Work Plan, Remedial Investigation Report and Remedial Work Plan and is overseeing remediation of OUs 3 and 4 of the Queens West Development – Stage 2 Site, an approximately nine-acre parcel which is the location of a former Standard Oil Company refinery and has been accepted into New York State’s Brownfield Cleanup Program (BCP). Mr. Glass also managed the design of active sub-slab depressurization systems for several high-rise (30-story) residential buildings at the site in Long Island City, Queens, New York.

Long Island Rail Road, Morris Park Yard, Remedial Design - Queens, NY (Remedial Design Manager: 2006 – Present)

Mr. Glass was responsible for supervising design and construction phase services for remediation of the petroleum contaminated Morris Park Yard. The project is in the location of an active rail yard facility, which has been the site of locomotive maintenance and related operations for over 100 years. The remedial systems include: an automated LNAPL extraction system, an automated bioventing system and an automated bioremediation system.

Public Works Complex and Fire Department Headquarters Vehicle Fueling Facilities Replacements – Danbury, CT (Practice Leader and Lead Design Engineer: 2007 – Present)

Under Mr. Glass’s supervision, TRC provided comprehensive design and construction phase services, including environmental, civil, structural and electrical engineering design services for removal and replacement of vehicle tanks, dispensers and related facilities and equipment at the City of Danbury Public Works Complex and Fire Department Headquarters. At the Public Works Complex a complete vehicle fueling facility (diesel and gasoline) was designed by TRC for use by the City Highway Department, Forestry Department, Police and Public Utilities Departments. TRC was able to completely eliminate the underground storage of diesel fuel and gasoline for vehicle fueling at the City Public Work Complex by incorporating into the design aboveground tanks and dispensers. An overhead canopy with under-deck lighting is also included to provide protection for vehicle drivers from adverse weather conditions. The new vehicle fueling facility includes a computer based automated fuel management and accounting system, which using on-board kits installed in city-owned vehicles allows for automatic control and monitoring of fuel use. The removal and replacement of the Fire

Department Headquarters fueling facilities was performed without interference with active operations. The gasoline dispensing facilities at the Public Works Complex and Fire Department Headquarters are both equipped with Stage I and Stage II vapor recovery.

New York City School Construction Authority, On-Call Environmental Consulting Services Contract (Practice Leader: 2006 to Present)

Mr. Glass serves as program manager for TRC's contract with the New York City School Construction Authority (NYCSCA). TRC has provided a broad range of services to the New York City School Construction Authority (NYCSCA), including environmental site assessment and remediation services, and has successfully completed over 100 environmental assignments for NYCSCA since March 2006.

Con Edison, Former MGP Plant Site at West 42nd Street – New York, NY (Remedial Design Manager: 2005)

Mr. Glass supervised preparation of the Remedial Work Plan for the West 42nd Street Con Edison former Manufactured Gas Plant Site. The RWP was prepared in accordance with the terms of a Voluntary Cleanup Agreement (VCA) with the NYSDEC. The remedial plan developed for the site was designed to meet the requirements of the NYSDEC for cleanup of the former MGP site as well as allow for the planned future use of the site: construction of a high rise apartment building.

Franklin Cleaners Site, Off-Site Groundwater Extraction and Treatment System – Hempstead, NY (Remedial Design Manager: 1999 – 2004)

Mr. Glass managed the pre-design investigation, design and construction oversight services for the off-site groundwater extraction and treatment system for the Franklin Cleaners Site (NYS Superfund Site Registry No. 1-3-050). The groundwater extraction and treatment system was designed to intercept a plume of tetrachloroethene (PCE) migrating toward the water supply wells of the Village of Rockville Centre. The pre-design investigation included an iterative delineation program at the leading edge of the plume, an aquifer pump test and contaminant transport modeling to establish extraction system design parameters. In addition to the pre-design investigation, Mr. Glass was responsible for preparation of the engineering design report, and design of the extraction wells, low-profile stacked-tray air stripper, instrumentation and controls, treatment system building, utilities, treated water discharge pump station and force main, storm sewer connection, site access road, site drainage structures, and landscaping. Contract documents, including detailed drawings and specifications, as well as an engineering cost estimate were prepared. The extraction and treatment system has been in operation since September 2003, has demonstrated an on-line availability of over 95%, has consistently exhibited a PCE removal efficiency of over 99%, and a significant decrease in contaminant concentrations in downgradient groundwater monitoring wells has been recorded. Mr. Glass also supervised operation, maintenance and monitoring of the

groundwater extraction and treatment system.

Franklin Cleaners Site, Source Area Remedial Action Services – Hempstead, NY (Remedial Design Manager: 1999 – 2004)

Mr. Glass managed the design of the source area remedial action for the Franklin Cleaners Site and provided construction management services. Contract documents, including drawings and specifications, as well as an engineering cost estimate, were prepared for the soil vapor and air sparging systems at the site. After approximately 12 months of operation, the concentrations of PCE in on-site groundwater monitoring wells were reduced below the standard of 5 ug/l.

KeySpan, Sands Point Golf Course Release Site – Sands Point, NY (Remedial Design Manager: 2000 – 2001)

Mr. Glass managed the pre-design investigation, design and construction oversight services for the groundwater extraction and treatment system to contain and remediate the release of dielectric cable fluid from a high voltage underground electric utility-owned cable. The groundwater contamination was migrating towards the Village of Sands Point water supply wells (NYSDEC Spill No. 001048). The pre-design investigation included an analysis of the solubility of dielectric cable fluid, an aquifer pump test, light non-aqueous phase liquid (LNAPL) product pump test and contaminant transport modeling to establish extraction system design parameters, and a carbon isotherm test conducted for use in sizing the granular activated carbon adsorption groundwater treatment system.

In addition to the pre-design investigation, Mr. Glass was responsible for preparation of the engineering design report, and design of the dual phase extraction well, solids filters, carbon adsorption system, instrumentation and controls, treatment system building, utilities, on-site treated water recharge system (dry well network), site access road, site drainage structures, and landscaping. Contract documents, including detailed drawings and specifications, as well as an engineering cost estimate were prepared. The extraction and treatment system has been in operation since April 2004, has demonstrated an on-line availability of over 95%, and has effectively contained the free and dissolved phase dielectric cable fluid.

Former Textiles Processing Facility, Soil and Groundwater Remediation Services – Moonachie, NJ (Remedial Design Manager: 2005 – Present)

Mr. Glass was the manager for remediation of tetrachloroethene contaminated soil and groundwater, including dense non-aqueous phase liquid (DNAPL), at a former textiles processing facility in Moonachie, New Jersey. Remedial design included selective building demolition, deep excavation, water-tight sheeting, and in-situ chemical oxidation.

American Cleaners Site, Remedial Action Services – Binghamton, NY (Project Director: 2004)

Mr. Glass supervised the preparation of the pre-design investigation report and plans and specifications for remediation of the American Cleaners Site in Binghamton, New York (Site Registry No. 7-04-030). The remedial action included demolition of existing site structures and removal of tetrachloroethene contaminated soil.

Lower Manhattan Development Corporation, 130 Liberty Street (former Deutsche Bank Building at “Ground Zero”) – New York, NY (Technical Advisor: 2006)

Mr. Glass provided engineering services in connection with evaluating a multi-million dollar claim for a change in contract scope and price by the deconstruction (demolition) contractor responsible for decontamination and removal of the former Deutsche Bank Building.

NJ Department of Environmental Protection (NJDEP), NJDEP-Funded Sites – Elmwood Park, NJ (Remedial Design Manager: 2001 – 2004)

Mr. Glass was manager for remediation of three (3) adjacent NJDEP publicly funded sites including a former electronics manufacturer, bulk chemical terminal and metal fabricator located in Elmwood Park, New Jersey, believed to be the source of VOCs impacting the City of Garfield, New Jersey, water supply well field. His responsibilities included pre-design delineation of groundwater contamination, and conceptual design of a permeable reactive barrier wall and groundwater extraction and treatment system.

Truck Fueling Facilities, Remediation Services – Mahwah, NJ (Remedial Design Manager: 2002 – 2004)

Mr. Glass was manager for remediation of two (2) adjacent truck fueling facilities located in Mahwah, New Jersey. Groundwater contamination had resulted from releases from underground petroleum bulk storage tank systems. His responsibilities included performing a design review for NJDEP of an existing groundwater extraction (interceptor trench) and treatment system (oil water separator and air stripper) and preparation of recommendations for system modifications to remediate a plume of BTEX and MTBE migrating toward the nearby municipal water supply well field. The project also included assessing discharge management options for the treated groundwater.

Liberty Industrial Finishing Site, Remediation Services – Brentwood, NY (Project Manager: 1998 – 2001)

Mr. Glass managed remediation of the Liberty Industrial Finishing Site, a former metals finishing facility, in Brentwood, New York (NYS Superfund Site Registry No. 1-52-108). The project included remediation of contaminated sediments in dry wells, and deep excavation of soil, which exceeded the TCLP regulatory limit for cadmium. Installation of sheeting was required for excavation of contaminated soil in a former pipe gallery adjacent to the main site building. Mr. Glass' responsibilities included supervising the pre-design investigation,

preparation of plans and specifications and the engineering cost estimate for the remedial construction, as well as supervising construction inspection services. Remediation of the site was successfully completed in April 2001.

Storonske Cooperage Site, Remedial Action, Construction Inspection and Oversight – Schodack, NY (Project Manager: 1997 – 1998)

Mr. Glass was Project Manager for construction inspection and oversight of operations, maintenance and monitoring for the Storonske Cooperage Site in Schodack, New York (NYS Superfund Site Registry No. 4-42-021). The remedial action consisted of soil vapor extraction (SVE) and excavation of PCB contaminated soil. His responsibilities included review of contractor's shop drawings, submittals and payment requests, supervision of a full-time on-site resident inspector, monitoring and evaluating system performance and operation, and preparation of the final remediation report.

Confidential Client – Mercury Contamination Remediation Services – NJ (Project Manager: 1998)

Mr. Glass was Project Manager for remediation of a mercury contaminated maintenance facility operated by a pharmaceutical manufacturer in New Jersey. This project included classification of the contaminated material for disposal and preparation of plans and specifications for remedial construction.

Fulton Avenue Site, Source Area Remediation Services – Garden City, NY (Remedial Design Manager: 1998 – 1999)

Mr. Glass was Project Manager for the design of a source area remediation system and plume containment system for the Fulton Avenue Site in Garden City, New York (Site Registry No. 1-30-073). The Fulton Avenue site is believed to be a source of VOCs which has contributed to the groundwater contamination plume emanating from the Garden City Industrial Park. This groundwater contamination plume has impacted over ten public water supply wells in the area. His responsibilities included preparation of drawings and specifications for construction, operation, maintenance and monitoring of the on-site SVE and air sparging systems and the off-site plume containment system using in-well air stripping technology, and engineering cost estimates for both the on-site and off-site systems.

AVM Gowanda Site, Environmental Services – Gowanda, NY (Remedial Design Manager: 2004)

Mr. Glass supervised preparation of the pre-design investigation report and the engineering design report for the AVM Gowanda site in Gowanda, New York (Site Registry No. 9-05-25). The remedial action includes a groundwater extraction and treatment system and permeable reactive barrier wall for containment of chlorinated VOCs in groundwater.

Brookhaven National Laboratory, Remediation Services – Upton, NY (Project Manager: 1997)

Mr. Glass was Project Manager for the conceptual design drawings for remediation of contaminated sediment in the Peconic River at Brookhaven National Laboratory in Upton, New York.

Mr. Glass also served as Project Manager for closure of the hazardous waste and mixed waste storage facility at Brookhaven National Laboratory (BNL), a Department of Energy (DOE) operated facility. Responsibilities included oversight of decontamination of four hazardous waste storage buildings and two mixed waste storage units, post-closure sampling and preparation of the final closure certification report.

Semiconductor Facility, Ex Situ Soil Vapor Extraction System Conceptual Design – NYS (Project Manager: 1997)

Mr. Glass was Project Manager for the conceptual design of an ex situ soil vapor extraction system for a major New York State semiconductor manufacturer.

City of Paterson, NJ, Sewer System Overflow Study – Paterson, NJ (Project Director: 2003 - 2004)

Mr. Glass was manager for the City of Paterson, New Jersey, combined sewer system overflow study. His responsibilities included supervising mapping of the combined sewer system, cleaning and televising sewers, flow monitoring, and modeling to identify sources of inflow and infiltration and minimize combined system overflows to surface water.

Bergen County Overpeck Park Site, Wetland and Landfill Closure Services – Leonia, NJ (Remedial Design Manager: 2004)

Mr. Glass was manager for stream bank stabilization, wetland restoration and landfill cover repair and closure of the over 400-acre Bergen County Department of Parks Overpeck County Park site (Leonia, New Jersey). The project included redevelopment of the landfill property for passive and active recreation.

Southhold Landfill, Landfill Closure Services – Southhold, NY (Project Manager: 1997 – 2001)

Mr. Glass was manager for the closure of a 34-acre municipal solid waste landfill in Southhold, New York. His responsibilities included preparation of the final landfill closure plan, plans and specifications, and a cost estimate for construction of the landfill capping system as well as supervising construction inspection services.

Fishers Island Landfill, Landfill Closure Services – Fishers Island, NY (Project Manager: 1999 – 2001)

Mr. Glass was Manager for the closure of a 10-acre landfill located in Fishers Island, New York. His responsibilities included preparation of the final landfill closure plan, and plans and specifications for closure of the landfill.

Trimmer Road Landfill, Landfill Cap Conceptual Design – Parma, NY

(Remedial Design Manager: 2001 – 2004)

Mr. Glass was manager for the conceptual design of the landfill cap for the Trimmer Road Landfill, Parma, New York (NYS Superfund Site Registry No. 8-28-012).

Danbury, Connecticut Landfill, Landfill Gas Extraction and Treatment System Construction Inspection and Operations Oversight – Danbury, CT (Project Director: 1997 – Present)

Mr. Glass was Project Manager for inspection, start-up and operations oversight for the landfill gas extraction and treatment system constructed at the 45-acre Danbury, Connecticut, landfill. The project involved oversight of construction, start-up and operation of the landfill gas extraction, collection and treatment system, including the packed tower scrubber and enclosed ground flare.

Captain's Cove Landfill – Landfill Remediation Services – Glen Cove, NY (Project Manager: 1999 – 2000)

Mr. Glass was Project Manager for remediation of the Captain's Cove landfill located in Glen Cove, New York (NYS Superfund Site Registry No. 1-30-032). His responsibilities included preparation of plans and specifications for reclamation of the landfill, backfill, grading and drainage, and supervising construction inspection services.

Cuba Landfill, Remediation Pre-Design Investigation – Cuba, NY (Remedial Design Manager: 2001)

Mr. Glass was Project Manager for the pre-design investigation for the Cuba Landfill, Cuba, New York (NYS Superfund Site Registry No. 9-02-012). The pre-design investigation included delineating the limits of waste, characterizing site geology/hydrology for design of a groundwater interceptor trench and evaluation of site conditions for phytoremediation.

Stafford Landfill, Pre-Design Investigation for Landfill Closure – Stafford, NJ (Remedial Design Manager: 2002 – 2004)

Under contract to the NJDEP, Mr. Glass managed the pre-design investigation for closure of the Stafford Landfill. He supervised excavation of over 100 test pits for waste delineation, installation and sampling of over 20 groundwater monitoring wells and leachate monitoring wells, leachate seep sampling, topographic surveying and mapping, and pre-design investigation report preparation.

Foundations & Structures Landfill, Pre-Design Investigation for Landfill Closure – Cape May County, NJ (Remedial Design Manager: 2002 – 2004)

Under contract to the NJDEP, Mr. Glass managed the pre-design investigation for closure of the Foundations & Structures Landfill in Cape May County. He supervised excavation of over 50 test pits for waste delineation, installation and

sampling of 15 groundwater monitoring wells and leachate monitoring wells, sediment sampling, surface water sampling, leachate seep sampling, topographic surveying and mapping, and pre-design investigation report preparation.

SPECIALIZED TRAINING

- 40-Hour OSHA Health and Safety Training

PROFESSIONAL AFFILIATIONS

- American Chemical Society
- American Institute of Chemical Engineers

BRIAN J. ROSS

EDUCATION

B.S., Materials Engineering, Rutgers University, 2003

PROFESSIONAL REGISTRATIONS

Engineer-In-Training, State of New Jersey, (Lic. # 13565) 2006

AREAS OF EXPERTISE

Mr. Ross has over 10 years of direct field experience working at:

- Heavy Construction Sites
- Hazardous / Hazardous Materials Sites

Mr. Ross has approximately five years of experience in;

- Environmental Remediation and Remedial System Operation & Maintenance
- Remedial Alternative Evaluation and Cost Estimating
- Remedial Investigations
- Environmental Construction Management & Quality Control

And also has one year of experience in;

- Construction Management

REPRESENTATIVE EXPERIENCE

Mr. Ross serves as an Engineer III in the Engineering Division with task management responsibilities for the installation, operation, maintenance, and monitoring of remediation systems and actions. Mr. Ross is also involved in the development and implementation of remedial designs and actions. Mr. Ross has varied project experience in the engineering, construction and environmental disciplines. He has extensive field experience in the heavy construction industry dealing with high pressure natural gas pipelines, fuel product pipelines, bridge decks, water main pipelines, asphalt paving, excavations, ironwork, and arc welding. His environmental qualifications include remedial investigations, remedial system design and installation, site inspections, and operation & maintenance of remedial systems.

Remedial Investigation, Implementation, Operation & Maintenance, and Environmental Construction Oversight

ExxonMobil, S.R.T. Bayway Refinery - Linden, NJ (Owner's Engineer/Field Engineer: 2008 - Present)

Mr. Ross serves in an owner's engineer role as well as a field engineer for multiple remediation jobs within the refinery. Mr. Ross's responsibilities in the

owner's engineer role vary from the review of bids of upcoming remediation projects, review of remedial project design documents, complete start to finish oversight of remedial design/build projects that cover a wide array of remedial strategies such as: soil removal/treatment and stabilization, cutoff walls/containment (steel and geomembrane sheet piles), pump-and-treat, capping (soil, and low permeability geosynthetic and asphalt), passive and active product recovery (skimming, bailing and vacuum extraction) and in-situ bioremediation located throughout the refinery. Mr. Ross's responsibilities in the field engineer's role consist of well/piezometer installation, free product gauging, air monitoring, and soil/ground water/air sampling events. He has received specialized safety training (L.P.S. and S.H.A.I.C.) to work within the refinery and maintains an excellent safety record. Mr. Ross works closely with ExxonMobil Project Managers and with the small list of ExxonMobil approved subcontractors permitted to work within the refinery limits.

Metuchen Realty Acquisitions, LLC, Metuchen, NJ (Field Engineer: 2008 - Present)

Mr. Ross is a lead engineer for the design/implementation of the full scale in-situ injection program to be conducted on-site in the Summer of 2012. In January 2011, Mr. Ross managed an in-situ injection pilot test, which utilized SRS[®], an emulsified vegetable oil amendment, to evaluate its effectiveness on remediating two separate areas of high concentrations of chlorinated ethenes in groundwater. In 2008, Mr. Ross performed subcontractor oversight for an in-situ bioremediation injection pilot test utilizing EHC[®], an integrated carbon and zero valent iron amendment, to evaluate its effectiveness on remediating high concentrations of chlorinated ethenes in both soil and groundwater. He also performed baseline ground water sampling as well as post-injection sampling.

COVC and LNAPL Impacted Site (Confidential Client) - Queens, New York City, New York (Project Manager: 2009 – 2010)

Mr. Ross was a key member of the field team, which was involved in the final phases of the remedial investigation and the assessment of remedial alternatives for the 1 acre site. Mr. Ross was the lead field engineer for a 2009 *In-Situ* Chemical Oxidation (ISCO) pilot test that was conducted at the site prior to the selection of Electrical Resistive Heating and Soil Vapor Extraction as the remedial alternative. Mr. Ross was part of the field team throughout the entire thermal treatment, which was conducted from the Summer 2010 to Fall 2011. Mr. Ross also participated with free product recovery that was conducted on-site.

SP - Virtis, Gardiner, NY (Project Engineer: 2007 - present)

He is the lead field engineer for an Exit Strategy[®] ground water remediation project. The site has a chlorinated solvent plume that has impacted residential water supply wells. Mr. Ross makes monthly inspections of the ground water remediation system while also performing operation & maintenance of the

system. He also performs quarterly ground water sampling of the point-of-use treatment systems and pumping wells at nearby residences.

Former New York Times Facility, Edison, NJ (Field Engineer: 2010)

Mr. Ross was the lead field engineer for the construction and implementation of a large scale SVE/ART system. Mr Ross was the lead field engineer for pilot testing phase prior to full-scale operation.

Former Washington Forge Cutlery Manufacturing Facility, Englishtown, NJ (Field Engineer: 2007 - Present)

Mr. Ross serves as a project/field engineer for the investigation and remediation of the aquifer impacted by chlorinated solvents and free floating fuel oil No. 4. His responsibilities include groundwater and free product delineation investigations; coordination of vapor intrusion sampling; field oversight of an in-situ bioremediation injection program utilizing emulsified vegetable oils; and operations & maintenance of a combined sump treatment and sub-slab depressurization system. In addition, Mr. Ross has coordinated and performed oversight for multiple high vacuum extraction/bio-slurping events for the removal of free product and dissolved phase groundwater impacted by large volumes of fuel oil No. 4.

SMC, Newfield Plant - Newfield, NJ (Remedial Engineer: 2008 - Present)

Mr. Ross serves as a remedial engineer for a Superfund project at a former exotic metal alloy production facility in southern New Jersey, under the TRC Exit Strategy[®] Program. Key issues include a large hexavalent chromium plume and a chlorinated ethene plume impacting the Cohansey aquifer with some impacted intervals over 100 feet thick. Mr. Ross was the lead field engineer for implementing the full scale Calcium Polysulfide injection program, which was conducted from 2011 - 2012 where approximately five million gallons of amendment were injected across the site. Mr. Ross managed every aspect of the injection field activities from the field including injection trailer modifications/design changes and resolving everyday issues that arose throughout the injection program. Prior to the full scale activities, Mr. Ross was an integral team member of phase I/II of an extensive pilot test program for the in situ remediation of high levels of dissolved hexavalent chromium in the groundwater. He also led the challenging soil and groundwater sampling program for a comprehensive laboratory treatability study and post-injection groundwater quality monitoring. Mr. Ross critically evaluated the results of phase I/II and co-authored the In-Situ Remediation Interim Report used to update the EPA of the remedial results from the first phase of the pilot test and supplemental treatability study.

Spill Prevention Control & Countermeasures Plan, Five client locations in NJ & NY (Field Engineer: 2008 - present)

Mr. Ross performed site inspections dealing with on site oil storage and spill prevention. He located all liabilities dealing with oil spillage/storage such as oil cleanup, oil containment structures (Aboveground/underground storage tanks, secondary containment, and piping) oil-using machinery maintenance and specifications of all equipment / oil transfer mechanisms on site.

Confidential Pigments Manufacturer, Newark, NJ (Field Engineer: 2007 - present)

Mr. Ross serves as the field representative that performs consultant oversight for possible litigation support for site environmental liability issues between client and a major chemical manufacturer. He also is responsible to perform quarterly asphalt cap inspections of the site and report all findings and maintenance suggestions to the client.

Ridgemont Shopping Center, Dry Cleaning Facility, Bergen County, NJ (Field Engineer: 2008 - Present)

Mr. Ross is an integral team member in the full scale design of an extensive SVE/ART system to be installed in 2012 located at an active shopping center with multiple leaseholds and challenging site constraints including building-use and utilities layout. Mr. Ross performed subcontractor construction oversight of a Soil Vapor Extraction / Air Sparging and SSDS trench installation. He also oversaw the installation of air moving equipment for two Sub Slab Depressurization Systems within active and vacant leaseholds as well as initial system evaluation (flow rate/vacuum, and radius of influence).

Dunphey-Smith Company —Union, NJ (Project/Field Engineer: 2008 - present)

Mr. Ross is part of a team responsible for the oversight of a former underground storage tank site where the soil and groundwater are impacted by gasoline-based free product detected in monitoring wells. He conducts ground water monitoring activities, free product removal activities, and reporting to the regulatory agency.

Center Avenue Holdings, Former Industrial Facility, Little Falls, NJ (Field Engineer: 2007 - Present)

Mr. Ross performed subcontractor oversight for the installation and development of several monitoring well clusters. He also performed oversight for the excavation of a TCE contaminated area of soil. Mr. Ross conducted multiple rounds of ground water sampling to monitor the progress of the in-situ remediation of chlorinated ethenes and BTEX compounds via biostimulation with emulsified vegetable oil.

SP Industries, Buena, NJ (Field Engineer: 2008 - present)

Mr. Ross served as a field engineer for the implementation of two in-situ pilot tests to evaluate the remediation potential of two different injection materials, Emulsified Oil Substrate (EOS[®]) and Emulsified Zero Valent Iron (EZVI[®]), for the reduction of hexavalent chromium in the groundwater at this former glass manufacturing facility. He performed oversight and task management for both pilot tests from the planning stages through post-injection ground water sampling. Mr. Ross co-authored summaries of the pilot tests included in the Remedial Action Progress report submitted to the NJDEP for review. He also was responsible for data organization and tabulation.

Unicorn Construction Enterprises, Inc., Woodhaven, NY (Project Manager: 2007)

Mr. Ross served as a project manager on various construction jobs including water main installations, seismic bridge footing reinforcement, bridge deck repair, paving and excavations. He managed all on-site personnel as well as delegated daily tasks to project foremen. Mr. Ross also arranged all subcontractors and documented project specific billing and budgeting.

Local Union 274, NJ (Journeyman: 2000 – 2007)

Mr. Ross was part of multi-faceted team that fabricated steel pipeline systems throughout NY, NJ and PA serving the region's natural gas/petroleum industry. Many sites were hazardous waste sites where specialized training was required for all people working on site. While working on all of these varying construction sites, Mr. Ross earned valuable experience and knowledge of the construction industry as well as acquired a keen sense of safe practices and loss preventative work methods.

SPECIALIZED TRAINING

- Loss Prevention System (LPS) Refresher Course, 2012
- SHAIK – Safety, Health & Administration Instructions for Contractors, 2011.
- Annual OSHA 8-hour HAZWOPER Refresher Course, 2011
- 10-Hour OSHA Compliance for the Construction Industry, 2011

APPENDIX B

NEW JERSEY ISSUED DRILLER'S LICENSE

protect our earth



STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Examination & Licensing Unit
PO BOX 441
Trenton, NJ 08625-0411
(609)-777-1013

*Please detach your license and carry it with
you for identification purposes.*

JAMES W DUFFY JR

Document #: 110532250

DEPARTMENT OF
ENVIRONMENTAL PROTECTION

STATE OF
NEW JERSEY

Hereby Certifies the Goodstanding of:

JAMES W DUFFY JR

SSN:

License No. 0001581

Reg No. MD1224

AS A LICENSED:

MASTER WELL DRILLER

Expires: 06/30/14

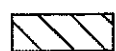
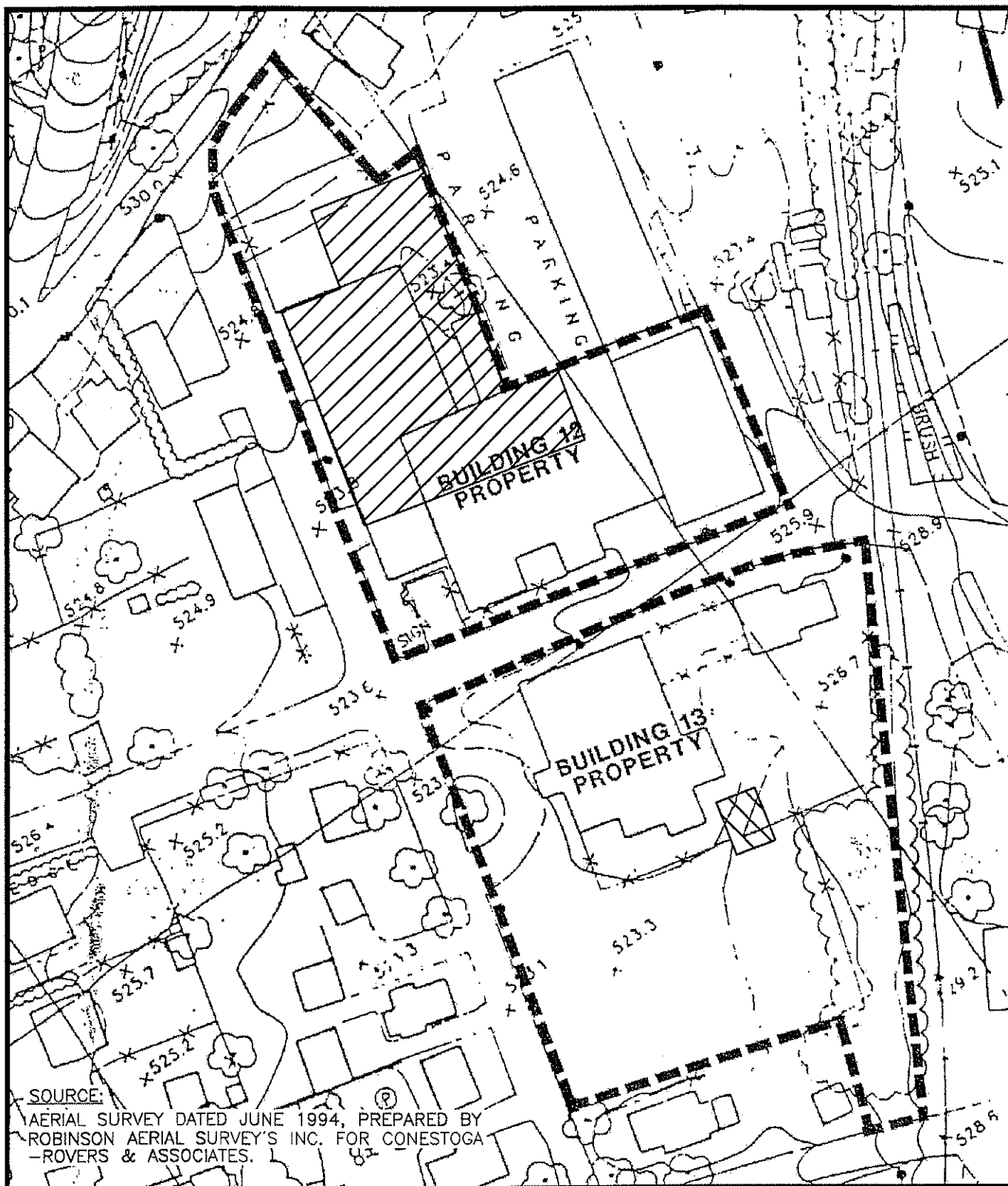
Document#: 110532250

TO DETACH

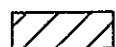
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ATTACHMENT 1

FIGURE 8 FROM 2007 ROD, DEPICTING SVE TREATMENT
AREA



-APPROX. AREA THAT WOULD BE
EXCAVATED UNDER REMEDIAL
ALTERNATIVE V6



-APPROX. AREA THAT WOULD BE
TREATED BY CHEMICAL OXIDATION
UNDER REMEDIAL ALTERNATIVE V6.



KLOCKNER & KLOCKNER PROPERTY
ROCKAWAY BOROUGH
MORRIS COUNTY, NEW JERSEY

REMEDIAL ALTERNATIVE
V6

ORIGINAL BY:

M.M.

DRAWN BY:

R.R.

DRAWING NO:

950302H1

CHECKED BY:

M.M.

DATE:

SEPT 2007

FIGURE NO:

8